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# USSR Report

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BIOMEDICAL AND BEHAVIORAL SCIENCES

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USSR REPORT  
LIFE SCIENCES  
BIOMEDICAL AND BEHAVIORAL SCIENCES

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## AEROSPACE MEDICINE

### PRESSURE CHAMBER THERAPY IN VASCULAR DISEASES

Moscow NEDELYA in Russian No 3, 14-20 Jan 85, p 10

YANINA, Anna

[Abstract] A new method of pressure chamber therapy in treatment of vascular diseases has been developed at the Gradskaya hospital hyperbaric oxygenation laboratory. Immersion of patients in a hermetically sealed oxygen bath exposes the whole body to oxygen; paralysis of hands and legs, which frequently accompanies vascular insult, gradually disappears. Results of treatment of 100 patients produced quick improvement in some cases but little change or bad results in others. The treatment must be used strictly according to indications for each patient.

[187-2791]

UDC 633.1:581.48

PREPLANTING ACTIVATION OF CONDITIONED GRAIN SEEDS

Moscow DOKLADY VSESOYUZNOGO ORDENA LENIN I ORDENA TRUDOVOGO KRASNOGO ZNAMENI AKADEMII SEL'SKOKHOZYAYSTVENNYKH NAUK IMENI V. I. LENINA in Russian No 12, Dec 84 (manuscript received 18 May 84) pp 3-5

AZIN, L. A. and POMANOV, P. P., Sverdlovsk Institute of the National Economy; Urals Scientific Research Agricultural Institute

[Abstract] Sprouting ability as well as other qualities play important roles in selecting seeds for planting. The present article reports on study of activation of hydrolytic enzymes such as gibberellin-like substances, amylase, alpha-glucosidases, beta-fructofuranosidases and proteinase. The wheat strain spring Mironovskaya and Isetskiy oats with initial moisture of no more than 14.5% were treated to activate the enzymes with air heating to 30°C for 5 days prior to planting. This had no noticeable effect on sprouting rates, which were already high, but biochemical changes were significant: catalase activity increased 13-15% over the 4 years in the wheat, and hydrogenase activity in both grains increased by 25-26%. Gibberellin-like substances were freed from a bonded state, so that they promoted sprouting. The sprouts accepted nutrients better and had a markedly higher survival rate after treatment, resulting in a 2.5-3 centner/hectare increase in yield. References 6 (Russian). [1026-12131]

UDC 633.11:631.527

EFFECT OF PREVIOUS GENERATION'S GROWING CONDITIONS ON DEVELOPMENT OF WINTER/SPRING WHEAT

Moscow DOKLADY VSESOYUZNOGO ORDENA LENIN I ORDENA TRUDOVOGO KRASNOGO ZNAMENI AKADEMII SEL'SKOKHOZYAYSTVENNYKH NAUK IMENI V. I. LENINA in Russian No 12, Dec 84 (manuscript received 20 Jul 84) pp 5-7

CHEL'TSOVA, L. P., All-Union Scientific Research Institute for Applied Molecular Biology and Genetics

[Abstract] In spring planting of winter/spring wheat, yields have been found to be greater when seeds from fall plantings are used than when spring-crop seeds are planted. The present article reports on study of this phenomenon in plantings of winter/spring wheats from France (Noe), Czechoslovakia



(Hlumetskaya 12), a Central Asian variety (Surkhak 5688) and the strain Moskovskaya 281. The French wheat showed better development from spring-crop seeds than from those of fall plantings. With domestic Moskovskaya 281, which in general grew more slowly than the French wheat, the fall-crop seeds produced larger plants by the third stage of development. With Hlumetskaya 12, the difference was noted even earlier (between the first and second stages), with the spring-crop seeds growing more rapidly. In later stages the fall-crop seeds of both Moskovskaya 281 and Hlumetskaya 12 developed more slowly, while no such differentiation was noted with the French wheat. The best additional yields from fall-crop seeds came when spring weather was relatively cool. When the cool weather retarded plant growth, better grain heads formed. References 3 (Russian).  
[1026-12131]

UDC 633.11"321":631.82

STUDY OF PHYSIOLOGICAL CHARACTERISTICS DETERMINING RESPONSE OF SPRING WHEAT STRAINS TO LEVEL OF MINERAL NUTRIENTS

Moscow DOKLADY VSESOUYUZNOGO ORDENA LENINA I ORDENA TRUDOVOGO KRASNOGO ZNAMENI AKADEMII SEL'SKOKHOZYAYSTVENNYKH NAUK IMENI V. I. LENINA in Russian No 12, Dec 84 (manuscript received 12 Jul 84) pp 7-9

SELITSKAYA, I. V., KOVENYA, S. V. and US'YAROV, O. G., Order of Labor's Red Banner Agrophysical Scientific Research Institute

[Abstract] Use of modern intensive, highly productive spring wheat strains requires special production techniques for specific periods in the growth cycle. The present article reports on study of ways to determine physiological characteristics, especially those related to levels of mineral fertilizer nutrition. Two opposite strains, Sete Cerros 66 used on irrigated land, and drought-resistant Saratovskaya 29, which can also stand mineral deficiency, were cultivated under greenhouse conditions with temperature at  $20 \pm 1^{\circ}\text{C}$  with 24,000 luxes of light. A Knop solution was used to control the administration of mineral fertilizers. Results showed the Saratovskaya 29 variety to be less sensitive to increased mineral levels than Sete Cerros 66, but tended to give more green mass than grain. Thus intensive types of grain tended to react better to increased mineral fertilizer amounts, while those of extensive cultivation (like Saratovskaya 29) tended to utilize the extra nutrients for the plant rather than the grain growth. Figure 1; references 6 (Russian).  
[1026-12131]

## ZEIN FORMULAS OF SELF-POLLINATING CORN LINES

Moscow DOKLADY VSESOYUZNOGO ORDENA LENINA I ORDENA TRUDOVOGO KRASNOGO ZNAMENI AKADEMII SEL'SKOKHOZYAYSTVENNYKH NAUK IMENI V. I. LENINA in Russian No 12, Dec 84 (manuscript received 21 May 84) pp 10-11

PERUANSKIY, Yu. V. and SAVIN, V. N., Kazakh Scientific Research Agricultural Institute imeni V. R. Vil'yams

[Abstract] In contrast to wheat gliadin and barley gordein, zein breaks down under electrophoresis in an acid buffer into a few components with molecular weight of 10-68 Kd. The present article reports on study of a new method for isolation and electrophoresis of zein in a polyacrylamide gel to develop new zein protein formulas for self-pollinating lines of corn. Corn varieties developed in Kazakhstan and the Ukraine were used in the tests. After removal of hull and germ, kernels were ground and treated with urea in a 70% ethanol solution, prior to electrophoresis of the zein. Results showed that self-pollinating corn lines vary in the number of components and in relative electrophoretic mobility. These features can be utilized to identify specific varieties of corn, using a "protein passport" read by their spectral patterns. References 8: 2 Russian, 6 Western.

[1026-12131]

UDC 633.11"324":584.13+631.84

## FEATURES OF NITROGEN ASSIMILATION BY WINTER WHEAT AT VARIOUS TEMPERATURES

Moscow DOKLADY VSESOYUZNOGO ORDENA LENINA I ORDENA TRUDOVOGO KRASNOGO ZNAMENI AKADEMII SEL'SKOKHOZYAYSTVENNYKH NAUK IMENI V. I. LENINA in Russian No 12, Dec 84 (manuscript received 20 Jul 84) pp 13-15

BIRYUKOV, S. V. and KRESTINKOV, D. A., All-Union Order of Lenin and Order of Labor's Red Banner Selection and Genetics Institute

[Abstract] Study of enzyme systems of primary nitrogen reduction has shown a direct connection between such activity and plant production only during the period when generative organs are being formed; earlier stages show either no such connection or an inverse dependency. The present article reports on an attempt to determine the possibility of a different interpretation. The authors stress that their experiments were conducted under ideal conditions and thus may not be valid for normal situations. Tests were made on winter wheat of several varieties: forest-steppe Bezostaya 1, Kavkaz, Mironovskaya 808 and Ukrainka, and steppe Priboy, Odesskaya 16, 51 and 66 and Kooperatorka, and a popularly-produced variety Krymka. Tests were conducted at 22°C with 31 Vt/m<sup>2</sup> lighting, with various amounts of nitrogen ranging from 1 to 10 times normal amounts. Sprouts were held at either 2 or 22°C for 36 hours when they reached an age of 7 days. At high temperatures and up to 5 times normal nitrogen, nitrogen-reducing enzymes in all varieties showed increased activity,

but with 10-fold nitrogen, such activity declined in the low-productivity varieties Odesskaya 16, Ukrainka, Kooperatorka and Krymka. At low temperatures the activity was suppressed in high-productivity varieties, while it remained stable or increased slightly in extensive-cultivation types. The tests are regarded as having shown potential, rather than likely performance under normal field conditions. References 5: 4 Russian, 1 Western.

[1026-12131]

UDC 581.134:633.11

DEPENDENCY BETWEEN NITRATREDUCTASE ACTIVITY AND CONTENT OF GLUTAMIC ACID AND PROLINE IN WHEAT GREEN MASS

Moscow DOKLADY VSESOYUZNOGO ORDENA LENINA I ORDENA TRUDOVOGO KRASNOGO ZNAMENI AKADEMII SEL'SKOKHOZYAYSTVENNYKH NAUK IMENI V. I. LENINA in Russian No 12, Dec 84 (manuscript received 3 Apr 84) pp 15-17

KRISHCHENKO, V. P. and LISOVAL, A. P., Central Institute for Agrichemical Services to Farms; Ukrainian Agricultural Academy

[Abstract] Nitratreductase plays a key role in determining nitrogen assimilation and, thereby, protein storage; the enzyme's activity is determined by the amount of nitrogen nitrate entering a plant. The present article reports on study of the relationship between reductase nitrate activity and aminoacid content of the winter wheat Il'ichevka, which was nourished with 30 ton/ha manure followed by basic fertilizer; basic fertilizer +  $N_{90}P_{80}K_{80}$ ; or base +  $N_{135}P_{120}K_{120}$ . Fertilizer was applied during tillering, earing and the milk-wax stage of grain formation. Analysis of grain showed that foliage development was dependent on reductase nitrate activity during tillering and content of glutamic acid and proline; these substances were closely related in metabolism. No other patterns related to nitratreductase activity and other amino acids could be perceived. Figures 2; references 4 (Russian).

[1026-12131]

UDC 546.32:539.163

USE OF POTASSIUM FROM STRAW AND BARLEY GREEN MASS BY PLANTS TAGGED WITH  $^{40}K$  RADIOISOTOPE

Moscow DOKLADY VSESOYUZNOGO ORDENA LENINA I ORDENA TRUDOVOGO KRASNOGO ZNAMENI AKADEMII SEL'SKOKHOZYAYSTVENNYKH NAUK IMENI V. I. LENINA in Russian No 12, Dec 84 (manuscript received 20 Jul 84) pp 17-18

BORISOVA, N. I., VASINEVA, L. V. and SEMENOV, Yu. I., All-Union Order of Labor's Red Banner Scientific Research Institute for Fertilizer and Agricultural Soil Science imeni D. N. Pryanishnikov

[Abstract] Little study has been reported of the role of straw and other post-harvest mass in providing nutrients for crops. The present article reports on use of isotope-tagged potassium to determine assimilation of

potassium from straw and barley foliage after plowing these harvest residues back into the soil. General content of potassium in the tagged mass was 0.7 to 1.2%, with beta-irradiation activity of 30-40 pulses/min. A first brief test sought to determine the possibility of measuring entry of low-level irradiated  $^{40}\text{K}$  in plant residues. When this proved possible, the main test was conducted to determine utilization of this potassium by barley in the tillering stage of development. Results showed that 52 to 59% of this potassium was utilized, which corresponded closely to the 61% used from regular mineral fertilizers. References 3 (Russian).  
[1026-12131]

UDC 631.416.2:631.442.1:631.874(597.7)

EFFECTS OF GREEN MANURE CROPS ON FORM COMPOSITION OF PHOSPHORUS IN SANDY MARITIME VIETNAMESE SOIL

Moscow AGROKHIMIYA in Russian No 10, Oct 84 (manuscript received 5 Nov 83)  
pp 21-25

FAN LIYEU and DAO TKHI GON, Institute of Geography, USSR Academy of Sciences, Moscow; Second Agricultural Institute, Vietnam

[Abstract] The composition of phosphorus forms in fallow, sandy, maritime soil in the Kuangnam-Danang Province of Vietnam was analyzed to assess the effects of planting green manure crops, as part of an effort to convert such lands to agricultural use. The studies were conducted in 1980-1981 with *Tephrosia candida*, *Crotalaria anagyroides*, *Leucaena glauca*, *Canavalia ensiformis*, *Phaseolus cancaratus* and *Vigna sinensis*. The plots were fertilized with 4 tons/ha of manure, 300 kg CaO per hectare, and N30P90K60 mineral fertilizer. The nitrogen component consisted of  $(\text{NH}_4)_2\text{SO}_4$ , 1/3rd of the phosphorus was in the form of superphosphate and 2/3rds as apatite, and potassium was provided by KCl. Planting of the crops under the conditions specified resulted in an increase in total free phosphorus, calcium phosphate, and of organic phosphorus. A decrease was noted in sesquioxide phosphorus. In the unplanted fields a sharp increase in sesquioxide (esp. iron) phosphorus was observed. In addition, the sowed fields showed an increase in the humus and nitrogen levels after 18 months, while the pH and the levels of Ca and Mg ions fell. References 10: 3 Vietnamese, 7 Russian.  
[1032-12172]

CONJOINT IN-ROW APPLICATION OF MINERAL FERTILIZERS WITH RICE SEEDS. PART 2.  
EFFECTS ON PRIMARY GROWTH AND DEVELOPMENT OF RICE

Moscow AGROKHIMIYA in Russian No 10, Oct 84 (manuscript received 11 Jul 83)  
pp 50-60

IGNATENKO, S. I. and RYMAR', V. T., All-Union Scientific Research Institute  
of Rice, Krasnodar

[Abstract] Laboratory and small-scale field trials were conducted on the effects of joint application of mineral fertilizers with rice seeds during planting, to test the effects of this approach on germination and development of rice. The fertilizer consisted either of N60, P45, K30, or NP, NK, PK or NPK combinations. On the basis of the studies with Krasnodar 424 rice, on the chernozem steppe land the individual components ranked as follows in effectiveness in terms of shoot growth and biomass accumulation:  $N > P > K$ . The analogous ranking for combinations was  $NP > NK > PK$ . In general, N90P60K30 was found most beneficial for Krasnodar 424 when applied in an amount of 0.427 g/100 g of fertilized soil. In the latter situation the mean height of the plants was  $27.0 \pm 1.9$  cm, the leaf area per plant was  $10.8 \pm 3.6$  cm<sup>2</sup>, and the root volume per 10 plants was calculated at  $3.7 \pm 0.7$  cm<sup>3</sup>. Figures 5; references 33 (Russian).  
[1032-12172]

EFFECTS OF LIMING ON PHOSPHATE AND POTASSIUM MOBILITY IN SODDY-PODZOLIC SOIL

Moscow AGROKHIMIYA in Russian No 10, Oct 84 (manuscript received 24 Aug 83)  
pp 80-85

POKHLEBKINA, L. P. and IGNATOV, V. G., All-Union Order of the Red Banner of  
Labor Scientific Research Institute of Fertilizers and Agricultural Pedology  
imeni D. N. Pryanishnikov, Moscow

[Abstract] A fifteen year study was conducted on soddy-podzolic soils in the Moscow Oblast to determine the effects of liming on phosphate and potassium mobility in the soil. Topsoil analysis with respect to pH and crop rotation demonstrated that at pH below 5.5, the K<sub>2</sub>O and P<sub>2</sub>O<sub>5</sub> concentrations are much higher than in soils with pH 6.0 or greater. In a similar fashion, phosphate and potassium mobility was also greater at the lower values of pH. These changes were attributed to the formation of more insoluble phosphate complexes at the higher pH values resulting from liming, as well as of insoluble forms of potassium. Figures 5; references 22: 15 Russian, 7 Western.  
[1032-12172]

## ACCUMULATION OF COPPER AND COBALT IN MICROBIAL BIOMASS OF NONCHERNOZEM SOILS

Moscow AGROKHIMIYA in Russian No 10, Oct 84 (manuscript received 15 Aug 83)  
pp 101-109

KOROBOVA, Ye. M., LETUNOVA, S. V., ALEKSEYEVA, S. A. and ZOLOTAREVA, B. N.,  
Institute of Geochemistry and Analytical Chemistry imeni V. I. Vernadskiy,  
USSR Academy of Sciences, Moscow

[Abstract] Copper and cobalt accumulation in the microbial biomass of nonchernozem soils (soddy, soddy-podzolic, alluvial, clayey, etc.) is a factor important in the circulation of these elements in the biogeochemical cycle. The degree of accumulation was found to be strongly dependent on the soil levels, which varied considerably for each element from region to region. A 15- to 70-fold difference was found in the copper levels in the humus layer, with the levels in the Perm and Kirov Oblasts exceeding those in the Novgorod and Kalinin Oblasts. A generally smaller spread applied to cobalt, usually showing a maximum 20-fold difference. Again, the levels in the Perm and Kirov Oblasts exceeded those in the Kalinin and Novgorod Oblasts. Within the upper soil layers (0-20 cm) the microbial biomass accounted for 0.0003 to 0.666 kg/ha of copper, and 0.0003 to 0.313 kg/ha of cobalt. These values represent, respectively, 0.003-3.95 and 0.001-0.047% of the total copper and cobalt in the soil. Figures 3; references 16 (Russian).  
[1032-12172]

UDC 632.954

## MATHEMATICAL MODELS OF PICLORAM DETOXICATION IN SOIL

Moscow AGROKHIMIYA in Russian No 10, Oct 84 (manuscript received 9 Sep 83)  
pp 114-122

BONDAREV, V. S., SPIRIDONOV, Yu. Ya., SHESTAKOV, V. G. and SHABANOV, A. K.,  
VNIIF [All-Union Scientific Research Institute of Phytopathology], Moscow  
Oblast

[Abstract] The Freundlich isotherm equation was applied to studies on absorptive factors on picloram detoxication in soddy-podzolic soils obtained from the Moscow region, in relation to temperature and moisture factors. The experimental approach consisted of mixing of soil samples with picloram, and subsequent determination of the herbicide by GLC. Determinations of  $t_{1/2}$  values yielded a range of 286 to 745 days at 5°C, 165-541 days at 25°C, and 132-327 days at 35°C. The lowest  $t_{1/2}$  values prevailed at 90% soil moisture. This method readily lends itself to calculation of the energies of activation and rate constants for detoxication of picloram, and appears to be applicable to actual field studies. Figures 6; references 11: 2 Russian, 9 Western.  
[1032-12172]

## USE OF 2,4-DA IN COMBINATION WITH ATRAZINE OR DUAL IN CORN SOWING

Moscow AGROKHIMIYA in Russian No 10, Oct 84 (manuscript received 4 Jul 83)  
pp 123-128

GULIDOV, A. M. and KRASNYKH, A. A., VNIIZR [All-Union Scientific Research  
Institute of Plant Protection?], Voronezh Oblast

[Abstract] The herbicides Dual and atrazine were tested for effectiveness in protecting corn crops, when alone and in combination with 2,4-D under a variety of conditions, in order to determine residual levels in relation to applied doses. The studies were carried out with VIR-42 and Krasnodar-436 corn varieties on chernozem soil, with Dual and atrazine used immediately after planting and 2,4-D at the 3-4 leaf stage. Chemical analyses demonstrated that the herbicides in question had no adverse effects on the crops alone or in combination. Trace levels remained in the plants and soil until the end of the vegetative period. Optimum weed control was obtained either with 1.5-2 kg/ha Dual or 2.5-3 kg/ha atrazine, with 2,4-D used in a concentration of 0.8 kg/ha. References 7 (Russian).  
[1032-12172]

## PESTICIDE EFFECTS ON SOIL MICROORGANISMS: METHODS OF ANALYSIS

Moscow AGROKHIMIYA in Russian No 10, Oct 84 pp 129-137

ANAN'YEVA, N. D.

[Abstract] Extensive use of pesticides has raised the question of their effects on the microbial flora of the soil, and how that in turn may affect the various biogeochemical cycles and soil formation. A review is presented of essentially western literature on the various methods used in assaying such effects of pesticides. It appears that, basically, such methods rely on estimation of population density, nitrification levels, and oxygen uptake. Results obtained with individual pesticides are mentioned. A rapid approach generally utilizes respirometric studies, since such a technique offers indication of overall microbial metabolic activity and can be correlated with population density of microbial cells. References 58: 9 Russian, 49 Western.  
[1032-12172]

## CYANOBACTERIA IN ARTIFICIAL ASSOCIATION WITH TOBACCO CALLUS TISSUES

Moscow MIKROBIOLOGIYA in Russian Vol 53, No 6, Nov-Dec 84  
(manuscript received 30 Jun 83) pp 997-1001

BAULINA, O. I., AGAFODOROVA, M. N., KORZHENEVSKAYA, T. G., GUSEV, M. V. and BUTENKO, R. G., Chair of Plant Physiology, Moscow State University imeni M. V. Lomonosov

[Abstract] Artificial associations of cyanobacteria (*Anabaena variabilis*) with tobacco (*Nicotiana tabacum*) were created via tissue culture techniques, in order to assess the morphologic and ultrastructural features of such laboratory-created phenomena. The experimental approach consisted of isolation of tobacco protoplasts and exposure to the cyanobacteria in a mixed tissue culture. After 42 days of joint culture, callus formation was observed with associated cyanobacteria on the surface of the callus, in intercellular spaces, and intracellularly. Scanning and transmission electron microscopy showed that the cyanobacteria exhibited considerable pleomorphism, which was particularly noticeably in the case of the intracellular anabaena. The ultrastructural features of the cyanobacteria varied with their location in relation to the tobacco tissue, and in many cases mimicked those observed in cyanobacterial monocultures. These findings suggest that the cyanobacteria may serve as an indicator system for the different ecologic and physiologic conditions prevailing within certain structures of the higher plants. In addition, protoplast-like cells suggest that the cyanobacteria may give rise to L-forms. Figures 2; references 20: 12 Russian, 8 Western.  
[1718-12172]

## EFFECTS OF AGING AND MOISTURE UPTAKE ON WHEAT GRAIN GLUTEN LEVELS AND PROPERTIES

Moscow BIOLOGICHESKIYE NAUKI in Russian No 12, Dec 84  
(manuscript received 14 Mar 83) pp 78-80

SUVTSEV, M. V. and REZUNENKO, M. S., Chair of Plant Physiology, Simferopol' State University

[Abstract] Studies were conducted on the effects of aging and moisture uptake on gluten concentrations and characteristics of two varieties of wheat grain, Bezostaya-1 and Priboy. Within 10 days of thrashing both varieties reached maximum gluten concentration (24.7-28.2% for Bezostaya-1, 26.2% for Priboy), which determines the baking properties of the flour, indicating that the 10-day period can be used for wheat classification. Increasing the water content of the grain had essentially no effect on the gluten concentration in the Bezostaya-1 grains, but resulted in a significant elevation in the gluten



levels of Priboy wheat. However, in both cases the gluten characteristics deteriorated markedly, as reflected in loss of tensile strength. Prolonged storage of wheat grain in the dry state had no deleterious effect on the quality of the wheat. References 7 (Russian).  
[248-12172]

UDC 633.11:585.2

#### EVALUATION OF STEM RUST RESISTANCE INDICATORS IN WHEAT UNDER LABORATORY CONDITIONS

Moscow BIOLOGICHESKIYE NAUKI in Russian No 12, Dec 84  
(manuscript received 12 May 83) pp 100-103

FILIPPOVA, G. G., KASHEMIROVA, L. A. and SANIN, S. S., All-Union Scientific Research Institute of Phytopathology

[Abstract] Benzimidazole agar culture of detached flag leaves, their sheaths and peduncles was used for the assessment of stem rust resistance of several varieties of wheat (Mironovskaya 808, Bezostaya 1, Odessa 66, Saratov 29, Kharkov 46, Moscow 35). Infectivity of the *Puccinia graminis* uredospores varied with the age and variety of the wheat tested, and correlated data were compiled for the coefficient of infectivity on the leaves, sheaths and peduncles. On the basis of the comparisons, the peduncles were determined to be a suitable target tissue for assessing wheat resistance to stem rust under laboratory conditions, with the benzimidazole agar technique a convenient approach to studies on age factors in resistance. References 25: 7 Russian, 18 Western.  
[248-12172]

UDC 631.84:631.85:631.816.3

#### EFFECT OF NITROGEN AND METHODS OF APPLYING SUPERPHOSPHATE ON ASSIMILATION OF SOIL PHOSPHATES AND FERTILIZERS BY PLANTS (STUDIES WITH <sup>32</sup>P)

Moscow AGROKHIMIYA in Russian No 1, Jan 85 (manuscript received 23 Jan 84)  
pp 24-31

SDOBNIKOVA, O. V. and PAYKOVA, I. V., All-Union Scientific Research Institute of Fertilizers and Soil Science, Moscow; All-Union Scientific Research Institute of Fodders, Moscow Oblast

[Abstract] Study of the effect of various methods of distributing superphosphate in the soil and additional application of nitrogen on crop yield and assimilation of phosphates of the fertilizer and the soil in vegetation, lysimetric and field experiments with the use of radioactive phosphorus are described and discussed. Application of superphosphate reduced the use of soil phosphorus by plants. The ratio of assimilated phosphorus of the soil

and fertilizer in the plants as a whole as well as in the reproductive and vegetative organs varied after different methods of applying the superphosphate to the soil. The method which permitted use of phosphorus of the fertilizer without reducing assimilation of soil phosphates was optimal. Migration of the basic amount of phosphorus  $K_2HPO_4$  in the barley vegetation months did not exceed 2-3 cm. In the model-field experiments and vegetation experiments, local application of superphosphate under barley in the 8 cm and 12-15 cm layers and application with seeds increased the output coefficient of fertilizer phosphorus in the initial period of vegetation. Nitrogen fertilizer had a mobilizing effect on assimilation of soil phosphates by the plants. References 4: 2 Russian, 2 Western.  
[1035-2791]

UDC 631.85:631.898

#### AGROCHEMICAL EFFECTIVENESS OF COMPOUND FERTILIZERS WITH PHOSPHORITE MEAL

Moscow AGROKHIMIYA in Russian No 1, Jan 85 (manuscript received 3 Feb 84)  
pp 32-37

YANISHEVSKIY, F. V., MALONOSOVA, I. A. and SENNITSKAYA, L. I., Scientific Research Institute of Fertilizers and Insectofungicides, Moscow

[Abstract] Agrochemical assessment of laboratory samples and experimental batches of complex fertilizers with addition of phosphorite meal to make up from 10 percent to 50 percent of the total phosphorus was performed in laboratory and vegetation experiments on sod-podzolic loamy soil. A model experiment showed that 80- to 90-percent of the water-soluble phosphorus studied passed into the soil in one day, reducing the granule size and making dissolution easier. Acidity of the aqueous solutions of the complex fertilizers and phosphorite meal was lower than that of nitroammophosk (NAFK) and complex mixed fertilizers (SSU) and depended on the amount of phosphorite meal introduced. Dissolution of the phosphorite meal in the complex fertilizers could proceed on both acid and slightly-acid soils. No differences in phosphates accumulation were seen for variants NAFK and NAFK+16-18 percent phosphorite meal after 3 months of interaction of the fertilizers with soil on acid soil while they equalled 12-15 percent on slightly acid soil. It was found that the strength of NAFK granules with addition of 40 percent phosphorite meal within the limits of 30-72 percent kgf/cm did not affect wheat yield but reduced entry of phosphorus into the plants. The effect of residual phosphates of NAFK containing 23-34 percent phosphorus in the form of phosphorite meal equalled the effect of residual phosphates of NAFK but it was much less after addition of 34 percent phosphorite meal against a limed background. References 2 (Russian).  
[1035-2791]

## DYNAMICS OF ACCUMULATION OF NUTRIENTS BY WINTER WHEAT IN YEARS WITH DIFFERENT WEATHER CONDITIONS

Moscow AGROKHIMIYA in Russian No 1, Jan 85 (manuscript received 5 Dec 83)  
pp 52-58

FEDOSEYEV, A. P. (deceased) and GRINENKO, L. A.

[Abstract] Study of the dynamics of nutrient level in the dry mass of plants and accumulation of nutrients by winter wheat crops as a function of weather conditions, carried out on medium-loamy podzolic soils in 1980-1981 and 1981-1982, with different weather conditions, is described and discussed. Methods of optimizing mineral nutrition of plants, especially nitrogen nutrition, should include consideration of existing and expected weather conditions which affect the intensity of entry of nutrients into plants and their level in the epigeal mass of crops. Dynamics of accumulation of nutrients in crops (in kg/hectare) were more clearly revealed by the need of plants for them than in the relative level of them in percents. Use of the indicator of nitrogen accumulation in crops at the phase of complete booting and prediction of the summer precipitation pattern made it possible to predict yield and optimize nitrogen top dressings of plants. Figures 4; references 17 (Russian).  
[1035-2791]

## EFFECT OF NUTRIENT SOLUTION CONCENTRATION ON PRODUCTIVITY AND CHEMICAL COMPOSITION OF SPRING WHEAT AS FUNCTION OF GROWING CONDITIONS

Moscow AGROKHIMIYA in Russian No 1, Jan 85 (manuscript received 11 Jan 84)  
pp 59-62

NILOVSKAYA, N. T. and BULGAKOVA, N. N., All-Union Scientific Research Institute of Fertilizers and Soil Science, Moscow

[Abstract] Effect of concentration of the nutrient solution on productivity of soft, short-stem Sete Cerros Mexican wheat was studied and described. Plants were grown under controlled conditions in a 1.6-28.7 mM range of concentration of the nutrient solution. The effect of concentration of the nutrient solution changed as a function of growing conditions of plants. When illumination intensity was lower than 100 W/m<sup>2</sup> (in autumn-winter period of vegetation), nutrient solution either did not affect plant productivity or productivity was higher after growing in a low concentration of the solution (3.3mM). In the spring-summer period of vegetation with lighting intensity at 300-400 W/m<sup>2</sup> productivity increased and a higher concentration (8.2 mM) of nutrient solution was required for maximum grain productivity. The level of nutrition elements in plant tissue usually did not depend on the nutrient solution concentration in the range studied and was not associated with

productivity of the plants. Under low illumination, the increase of total salt concentration up to 20.5 mM was accompanied by an increase of N, P and K level in plant tissues with simultaneous reduction of biomass accumulation. References 24: 18 Russian, 6 Western.  
[1035-2791]

UDC 631.874.3:633.16

EFFECT OF ROOT AND STUBBLE RESIDUES OF CEREAL LEGUMINOUS CROPS ON SPRING  
BARLEY PRODUCTIVITY

Moscow AGROKHIMIYA in Russian No 1, Jan 85 (manuscript received 5 Dec 83)  
pp 63-65

GNETIYEVA, L. N. and BARYSHNIKOVA, L. M. (All-Union Scientific Research  
Institute of Cereal Leguminous and Groats Crops, Orel

[Abstract] Study of the effect of root and stubble residues of cereal-leguminous crops on productivity of spring barley on grey, forest, medium-clayey soil showed the biological nitrogen in these residues to be as effective as mineral fertilizer. The root and stubble residues provided the soil with 23-67 hectares of organic mass per hectare. This mass contained 45-125 kg of nitrogen per hectare, 8-22 kg of phosphorus per hectare and 19-79 kg of potassium per hectare. Intensive mineralization of the root and stubble residues promoted accumulation of a considerable amount of mineral nitrogen during spring sowing of barley and this created favorable conditions for good barley productivity. Biological nitrogen in the residues increased barley grain yield by 103.6-131.0 kg/hectare, on an average for 3 years. The action of the residues equalled the effect of 30-60 kg of mineral nitrogen per hectare when applied under barley on an oat precursor. References 5 (Russian).  
[1035-2791]

UDC 631.821:631.582

EFFECT OF GRIST FINENESS OF LIMESTONE MEAL ON AGROCHEMICAL CHARACTERISTICS OF  
SOD-PODZOLIC CLAYEY SOIL AND ON CROP YIELD IN FIELD CROP ROTATION WITH FLAX

Moscow AGROKHIMIYA in Russian No 1, Jan 85 (manuscript received 5 Dec 83)  
pp 66-69

ALEKSEYEVA, L. I., Novgorod Experimental Station of Agronomy

[Abstract] Studies were performed at Novgorod Experimental Station from 1965-1981 in order to determine optimal sizes of limestone meal particles on sod-podzolic-gley, clayey soil of average cultivatability on various crop rotations. Limestone meal of all classes and particle sizes with a diameter of less than 3 mm had an equal positive effect of agrochemical properties and crop yields. The best effect of limestone meal was noted on perennial grasses in the first year of use. A complete dose of liming in 2 applications

increased, on an average for 1 year, productivity of a crop rotation by 3.7 centners of grain units per hectare while repeated liming produced 5.0-6.6 centners of grain units per hectare, on an average for 1 year.

References 3 (Russian).

[1035-2791]

UDC 631.82:631.821

# BIOLOGICAL ACTIVITY OF SOD-MEDIUM PODZOLIC SOIL DURING LONG-TERM USE OF MINERAL FERTILIZERS AND LIME

Moscow AGROKHIMIYA in Russian No 1, Jan 85 (manuscript received 1 Dec 83)  
pp 77-85

PIVOVAROV, G. Ye., GOMONOVA, N. F. and SHIRSKAYA, G. M., Educational  
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[Abstract] Study of the change of biological properties of acid and limed sod-medium podzolic soil during long-term use of mineral fertilizers was carried out in 1973-1981. Prolonged use of ammonium nitrate by itself and in combination with potassium chloride on acid sod-podzolic soil worsened the biological properties of the soil and reduced yields. Use of these fertilizers on limed soil improved the biological activity of the soil and increased the yield in comparison with the control figure for lime. Prolonged use of ammonium nitrate and potassium chloride without superphosphate on limed sod-podzolic soil sometimes prolonged the "latent" negative action of mineral fertilizers on biological properties of the soil. These findings parallel those for an analogous field experiment begun at Moscow State University Agrobiological Station in 1950. Figures 5; references 20: 19 Russian, 1 Western.

[1035-2791]

UDC 632.95

# COMBINED USE OF PESTICIDES AS A METHOD OF INCREASING EFFECTIVENESS AND SAFETY OF CHEMICAL PROTECTION OF PLANTS

Moscow AGROKHIMIYA in Russian No 1, Jan 85 (manuscript received 24 Apr 84)  
pp 86-91

ZHUKOVSKIY, S. G., IVANOV, S. G. and MALAKHANOVA, Ye. L., All-Union Institute  
of Plant Protection, Leningrad

[Abstract] Laboratory and field studies were carried out to assess the effect of organophosphorus and organochlorine insecticides and fungicides (copper perchlorate, zineb and cuprosan) on the Colorado beetle and phytofluorosis. The use of the insecticide and fungicide mixture delayed appearance of potato phytofluorosis by 3-6 days in all cases while the number of infected plants decreased from 54 percent to 36-38 percent and the degree of injury to the haulm decreased from 25-30 percent to 10-12 percent with 100 percent destruction

of Colorado beetle larvae. A 10-fold reduction of the insecticide dose in a mixture with the fungicides produced 86-94 percent biological effectiveness of the mixtures which parallels the results produced by one insecticide in the recommended doses. The increased toxicity of the mixtures was caused by the fact that the mixture of organophosphorus insecticides and zineb, on one hand, accelerates metabolism of the insecticide with formation of a highly toxic oxidized analog with high anticholinesterase activity and, on the other hand, forms isothiocyanate which is also toxic. Both of these compounds actively inhibited cholinesterase and carboxyesterase activity and this increased the inhibiting activity of the mixture greatly. Spraying clover with the fungicide and insecticide mixture greatly inhibited feeding of clover boll weevils and made them more susceptible to the insecticides. The antiphydant effect lasted 15-20 days. Figures 4; references 7 (Russian).  
[1035-2791]

UDC: 577.11:616.127

CYCLIC-AMP-DEPENDENT PROTEIN KINASE ACTIVITY AND PHOSPHORYLATION OF PHOSPHOLAMBAN OF HEART IN PRESENCE OF CIRCULATORY HYPOXIA. EFFECT OF TRYPSIN ON PHOSPHORYLATION CAPACITY

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 275, No 2, Mar 84 (manuscript received 25 Oct 83) pp 490-493

[Article by A. Ye. Antipenko and S. N. Lyzlova, Leningrad State University imeni A. A. Zhdanov (submitted by Academician S. Ye. Severin on 15 Oct 83)]

[Text] Recently, it was established that processes activated by Ca ions and cyclic nucleotides play a key role in controlling contractility of the myocardium. This regulation is effected, in particular, by means of cAMP and calmodulin-dependent phosphorylation of target proteins in myofibrils, sarcolemma and the sarcoplasmic reticulum (SR).

Thus, it was shown that there is close interaction between Ca, Mg ATPase of the SR and phospholamban, a low-molecular component of reticulum membranes. This interaction apparently consists of modifying the hydrophobic properties of the pump coordinated with cAMP-dependent phospholamban phosphorylation. As a result of these events there is change in rate of active transport of Ca ions through the vesicular membrane of SR [1, 2] which, in turn, provides for a proper diastole and, consequently, systole. Thus, phosphorylation of phospholamban of the myocardium apparently has physiological importance; at the same time, occurrence of this process in the presence of myocardial ischemia has been virtually unstudied. Because of this, as well as in view of the increased proteolytic activity in the ischemic zone [3], we undertook a study of cyclic AMP-dependent phosphorylation of phospholamban combined with trypsin treatment and activity of cAMP-dependent protein kinase in the myocardium in the presence of circulatory hypoxia.

We produced circulatory hypoxia in dogs weighing 15-18 kg by means of blood-letting to an arterial pressure of 50 mm in 3 h. We examined the ischemic tissue of the left ventricle, and similar parts of the myocardium from healthy animals served as a control. The microsomal fraction was isolated by the method of Hicks et al. [1], and cAMP-dependent protein kinase was recovered according to Wastila et al. [4]. Microsomes were submitted to phosphorylation in a medium of the following composition: 0.1 M KCl, 0.5 mM MgCl<sub>2</sub>, 0.15 mM  $\gamma$ -<sup>33</sup>P-ATP (3.3 Ci/mmol), 2.5 mM EGTA, 15 mM NaN<sub>3</sub>, 20 mM NaF, 40 mM tris-HCl at pH 7.0 in the presence or absence of 10<sup>-6</sup> M cAMP and 0.2 mg/ml

protein kinase. To assess incorporation of  $^{33}\text{P}$  in phospholamban, the microsomal fraction was submitted to electrophoretic separation in PAAG [5]; phospholamban was identified according to relative molecular weight, 22,000 dalton. Radioactivity of phospholamban was measured as previously described [6]. We determined activity of cAMP-dependent protein kinase according to binding of  $^{33}\text{P}$  by unseparated histone in myocardial homogenates, in the presence and in the absence of  $10^{-6}$  M cAMP [7]; homogenate dilution 1:30. We assayed cAMP using the set of reagents of the Amersham firm, England.

The studies revealed (Table 1) that the level of base phosphorylation (in the absence of exogenous cAMP, protein kinase and trypsin) of intact microsome phospholamban constituted about 19% ( $2.55 \pm 0.4$  nmol  $^{33}\text{P}$ /mg protein) after incubation for 10 min at  $30^\circ\text{C}$ , in relation to the level stimulated with  $10^{-6}$  M cAMP and exogenous protein kinase within the same time (control level--exogenous phosphorylation); in the presence of  $10^{-6}$  M cAMP and without exogenous protein kinase (endogenous phosphorylation), the phosphorylation level reached 71% of the control. A comparison of levels of phosphorylation of phospholamban from intact and damaged myocardium showed about the same basic phosphorylation, with substantial difference (1.6-fold) with cAMP-stimulated endogenous phosphorylation and equalization of levels of exogenous phosphorylation ( $13.8 \pm 0.8$  and  $12.9 \pm 1.1$  nmol  $^{33}\text{P}$ /mg protein in 10 min in the control and with hypoxia, respectively). The result of exogenous phosphorylation of phospholamban from ischemic and healthy myocardium warrants the assumption that there is equivalent capacity for phosphate modification of target protein molecules in these cases.

Table 1. Phosphorylation of cardiac phospholamban in the presence of circulatory hypoxia, with and without trypsin

Test, medium	Protein-bound P, %	
	normal	hypoxia
Without cAMP, protein kinase and trypsin	$19 \pm 3$ (9)	$20 \pm 4$ (8)
With cAMP	$71 \pm 7$ (12)	$44 \pm 5$ (10)
With cAMP + protein kinase	$100 \pm 6$ (10)	$94 \pm 8$ (8)
With trypsin, then inhibitor, then cAMP + protein kinase	$8 \pm 1.1$ (6)	$6 \pm 1.3$ (8)
With cAMP, then trypsin	$67 \pm 8$ (8)	$28 \pm 4$ (9)
With cAMP + protein kinase, then trypsin	$98 \pm 9$ (12)	$89 \pm 7$ (8)

Note: Number of tests given in parentheses.

In the next series (Table 1), the microsomes were treated with trypsin (0.25 mg/ml) in an incubation medium for phosphorylation containing no cAMP, protein kinase and ATP. After incubation for 5 min, we added the trypsin inhibitor, phenylmethylsulfonyl fluoride (0.5 mM), after another 5 min we added cAMP and, in a number of cases, protein kinase. In those cases where phosphorylated microsomes were treated with trypsin, phosphorylation was effected as described above. After 10 min we added trypsin and, after 5-min treatment, the inhibitor. In the control series, after exogenous phosphorylation, trypsin and the inhibitor were added simultaneously, and the obtained values did not differ from those obtained with exogenous phosphorylation under normal and hypoxic conditions.



As can be seen in Table 1, pretreatment with trypsin led to virtually complete loss of phospholamban's capacity for phosphorylation in both the ischemic and intact myocardium. Both exogenous and endogenous phosphorylation of phospholamban of healthy muscle had an absolute protective effect against trypsin; in the case of hypoxia, this effect was observed only with exogenous phosphorylation. These data are indicative of a correlation between degree of phosphorylation of the damaged and intact myocardium and its vulnerability to trypsin: whatever the result of structural reorganization of phospholamban due to its phosphorylation, apparently this is associated with modification of segments of the molecule of this protein that are sensitive to proteinase attack.

The observed decline of endogenous phosphorylation of phospholamban in the presence of circulatory hypoxia and corresponding absence of protective effect of phosphorylation when microsomes were treated with trypsin could be due to change in protein kinase activity in the damaged myocardium. For this reason, we determined protein kinase activity in the absence (-cAMP) and presence (+cAMP) of cyclic nucleotide, as well as cAMP content, in homogenates of ischemic and intact myocardium with addition of epinephrine in two concentrations ( $5 \cdot 10^{-5}$  and  $5 \cdot 10^{-4}$  M) (Figure 1). We assessed protein kinase activity (-cAMP/+cAMP) according to degree of dissociation of the holoenzyme with release of a catalytic subunit and corresponding change in phosphorylating activity [6]. As can be seen in Figure 1, basic cAMP content underwent virtually no change in the damaged myocardium, as compared to the control ( $547 \pm 48$  and  $625 \pm 51$  pmol/g tissue, respectively); in response to increase in hormone concentration to  $5 \cdot 10^{-4}$  M, there was increase in cAMP content of homogenates of both intact and, though to a lesser extent, ischemic myocardium. In this case, the protein kinase activity ratio (-cAMP/+cAMP) increased appreciably, from 0.57 to 0.79, in the intact myocardium, whereas in the damaged heart this ratio did not undergo statistically significant changes in response to elevation of level of endogenous nucleotide; probably this factor plays a deciding role in the observed decline of endogenous phosphorylation of phospholamban in the presence of hypoxia with saturating concentrations of cAMP.

The demonstrated impairment of capacity of the holoenzyme to be activated under the effect of cAMP could be due, in particular, to increase in proteolytic activity in the ischemic zone. For this reason, it appears even more significant that there was increased susceptibility to trypsin of phospholamban under hypoxic conditions due to impaired phosphorylation of this protein. The latter event, in turn, could be important to control of active transport of Ca ions in the sarcoplasmic reticulum of the damaged heart. We are pursuing studies in this direction at the present time.

#### FIGURE CAPTION

Figure 1. p 491 X-axis, epinephrine, M [twice]  
Y-axis, left to right: -cAMP/+cAMP  
cAMP, pmol/g tissue  
cAMP/+cAMP  
cAMP, pmol/g tissue

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CSO: 8144/0791

UDC 578.245.4

tRNA AS ACTIVATOR OF INTERFERON-INDUCED PROTEIN KINASE

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 280, No 1, Jan-Feb 85  
(manuscript received 24 Apr 84) pp 233-235

VERKHATSKAYA, A. A., RIBKINSKA, T. A., SIDORIK, L. L. and MATSUKA, G. Kh.,  
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[Abstract] Mouse lymphoma ON-1K cell line was employed in studies on the activation by tRNA of protein kinase induced by interferon. Phosphorylation activity was assessed on the basis of phosphorylation of endogenous P1 protein, or of the alpha-subunit of the initiation factor eIF-2 isolated from the rat liver. The data showed that yeast rRNA functioned in activating protein kinase induced by interferon, which suggest that in vivo rRNA has yet another physiological role. Such findings fit into reports suggesting activation of protein kinases in cells treated with interferon, in the face of absence of an endogenous activator of protein kinases. Figures 2; references 15 (Western). [1720-12172]

UDC 595.7:526.8.097.29

EFFECTS OF BACILLUS THURINGIENSIS DELTA-TOXIN ON ACTIVE ION TRANSPORT IN INSECTS

Novosibirsk IZVESTIYA SIBIRSKOGO OTDELENIYA AKADEMII NAUK SSSR: SERIYA  
BIOLOGICHESKIKH NAUK in Russian No 18(392), Issue 3, Dec 84  
(manuscript received 17 Mar 83) pp 113-116

KAMENEK, L. K. and SHTERNSHIS, M. V., Siberian Scientific Research Institute of  
Agriculture and Agricultural Chemization, Siberian Department, All-Union  
Agricultural Academy, Novosibirsk

[Abstract] The effects of delta-toxin (DT) of *Bacillus thuringiensis* on ATPase activity and cation concentrations in insects were studied on *Lymantria monacha* and *Lymantria dispar* stage IV caterpillars. Per os administration of DT resulted in immediate activation of intestinal  $Mg^{2+}$ -dependent ATPase, and in elevation of hemolymph concentrations of  $K^+$ ,  $Ca^{++}$  and  $Mg^{++}$ .  $Na^+$  levels, however, were unaffected. Temporal analysis of the effects indicated that ATPase activation preceded changes in active ion transport, which resulted in changes in hemolymph levels of the cations of interest. The primary effects of DT appear to be due to uncoupling of oxidative phosphorylation in the target insects. Figures 1; references 14: 6 Russian, 8 Western. [1034-12172]

## BIONICS

### BRIEF

BIONICS ARCHITECTURE IN NAVOI--(YzTAG)--The first architectural bionics section in Uzbekistan has been developed at Navoi. The Navoi architects are doing fruitful work on the problems of using various bioforms. Their work has been displayed at all-union and international exhibitions. A number of the plans prepared by Martin Antonyan, member of the USSR Union of Artists, were presented at the "Style 2001" International Congress, which is held by the Japanese Association of Architects. The work of the Navoi section is coordinated and guided by the Laboratory of Architectural Bionics of the Central Scientific-Research Institute of the Theory, History and Future Problems of Soviet Architecture. The Navoi workers have been entrusted with determining these architectural and bionic principles which will reduce the cost and enhance the comfort and esthetics of development under the extremal conditions of Kyzyl. [Text] [Tashkent PRAVDA VOSTOKA in Russian 25 Jan 85 p 4] 12151

CSO: 1840/206

SPIRAL VORTICES IN THREE-DIMENSIONAL ACTIVE MEDIA

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 279, No 4, Dec 84  
(manuscript received 7 May 84) pp 1000-1002

PANFILOV, A. V., RUDENKO, A. N. and PERTSOV, A. M., Institute of Biological Physics, USSR Academy of Sciences, Pushchino, Moscow Oblast

[Abstract] Vortex structures classified topologically as spiral vortices, described as rotating waves with a helical surface, were analyzed mathematically and described. In a homogeneous medium spiral vortices with an open line were unstable and evolved into simple vortices with rotation; this indicated that such vortices were physically impossible in homogeneous media. Stable, stationary spiral vortices, however, formed from simple vortices in a wide variety of heterogeneous media and over a broad range of parameters, if there was a gradient along the vortex line. The spiral structure was caused by differences in rotation rate. Complex periodic regimes may arise in the case of extreme heterogeneity. These findings have biological and medical application in that vortices are also observed in electrically excitable media such as heart and nervous system tissue. Various diseases, e.g., paroxysmal tachycardia and fibrillation, are related to the appearance of such vortices. Figures 2; references 6: 3 Russian, 3 Western.  
[1685-9307]

THEORETICAL ANALYSIS OF CURRENT DEPENDENT BLOCKING OF IONIC CHANNELS OF EXCITED MEMBRANES

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 279, No 6, Dec 84  
(manuscript received 21 May 84) pp 1500-1503

TESLENKO, V. I., Institute of Theoretical Physics, UkSSR Academy of Sciences, Kiev

[Abstract] Mathematical analysis of current-dependent blocking of an assumed individual ionic channel filled with a quasi-homogeneous, dynamically-polarized medium is presented and discussed. Examination of an individual ionic channel with 2 states (open and completely blocked) is presented as an example. The presence of a blocking agent did not affect the volt ampere characteristics of  $j_1^{\text{st}}$  of the open state of the individual ionic channel but changed the probability of its realization. Figure 1; references 9: 3 Russian, 6 Western.  
[1700-2791]

## BIOTECHNOLOGY

### BRIEFS

FEED SUPPLEMENT PRODUCTION DISCUSSED--Protein-vitamin concentrates (BVK's) have been produced somewhat ahead of plan according to data for two decades. The Kstovsk collective in the Gorkiy Oblast, the Ufamskiy experimental-industrial BVK plant collective, and the Novopolotsk and Mozyr BVK plant collectives in Belorussia have set the tone in competition. However, the significant addition provided by outstanding workers starting with the first days of the year is partially neutralized by the unsatisfactory work of the Angarsk, Bashkir and Kremenchug BVK plants. While the activity of the first two enterprises reflects a paraffin shortage, the lag in Kremenchug is tolerated because of disturbances in technology. At present the branch is behind plan in output of premixes and feed yeasts. The Kedansk biochemical plant in Lithuania, the Volzhsk yeast hydrolyzate plant in the Volgograd Oblast, the Progress Plant in the Tselinograd Oblast and the Lobvinsk hydrolytic plant in the Sverdlovsk Oblast are delivering. The regularly rhythmic work of the Ziminsk plant in the Irkutsk Oblast, the Khakassk hydrolytic plant and the Kirov biochemical plant, which supply feed yeasts, and also the Groznensk biochemical plant and the Nemeshayevsk biochemical preparations plant, which manufacture premixes, confirm the possibility of eliminating liabilities which have arisen for these forms of feed additives. [By N. Fedorov] [Text] [Moscow EKONOMICHESKAYA GAZETA in Russian 5 Jan 85 p 4] 12410

PROTEIN BIOSYNTHESIS PRODUCTION PROBLEMS--The Main Administration of the Microbiological Industry at the USSR Council of Ministers supports the reporting in the EKONOMICHESKAYA GAZETA [No 27 of 1984, "Protein from Hydrogen"] on the problems of the microbiological industry. The biosynthesis of protein based on hydrogen bacteria is being studied by the All-Union Scientific Research Bioengineering Institute in collaboration with a number of institutes of the USSR Academy of Sciences, principally the Biophysics Institute of the Siberian Department of the USSR Academy of Sciences and the Microbiology Institute of the USSR Academy of Sciences. Under laboratory conditions and in pilot units of the institutes, results were achieved which permit conversion to production of large-scale lots of protein and their wide medical and biological testing. Preliminary studies in this field showed extremely encouraging results. However, the development of work for experimental and experimental-industrial purposes, the performance of which is necessary to obtain representative lots of the product and the development of technology and conversion to industrial adoption are clearly restrained by insufficient attention to this problem from the direction of the Ministry of Mineral Fertilizer Production, together with other related organizations. At one time, a decision was made to establish the Grodno Azot Production Association, which was to be an experimental unit at first (in 1983) and an experimental-industrial unit later (in 1987) for production of protein from hydrogen, which is a by-product of the

production of this Association. A special laboratory financed by our Main Administration was established here in conformity with the joint order of the Main Administration of the Microbiological Industry and the Ministry of Mineral Fertilizer Production on 21 Jul 81. The Belgiprobiosintez Institute developed a design of an experimental unit. The place of its construction was decided because of the means for microbiological production. Unfortunately, the matter also came to a standstill for this. Construction has not begun at this time. The Azot Production Association abandoned the accomplishment of the project by the economic method, and the Ministry of Industrial Construction of the republic does not take work on contract. As a result of this lack of coordination, there are no possibilities for conducting studies; the establishment of experimental-industrial units and timely solution of the problem at all seemed to be under a threat of stoppage. [By V. Ogarkov, deputy chief of the Main Administration of the Microbiological Industry at the USSR Council of Ministers] [Text] [Moscow EKONOMICHESKAYA GAZETA in Russian 5 Jan 85 p 10]  
12410

CSO: 1840/213

INFECTION OF COLORADO POTATO BEETLE BY SOME INSECT VIRUSES

Kiev DOKLADY AKADEMII NAUK UKRAINSKOY SSR, SERIYA B: GEOLOGICHESKIYE, KHIMICHESKIYE I BIOLOGICHESKIYE NAUKI in Russian No 12, Dec 84  
(manuscript received 2 Apr 84) pp 58-60

KANYUKA, V. Yu., Institute of Molecular Biology and Genetics, Ukrainian SSR Academy of Sciences, Kiev

[Abstract] Iridovirus cultured in *Galleria mellonella* larvae was found effective in killing 94.8-100% of stage IV larvae of the Colorado potato beetle (*Leptinotarsa decemlineata*) on intralymphatic administration, as well as 40% of the imagos infected via the same route. Preliminary studies on the utility of this virus for the biological control of the Colorado beetle were also done with virus suspensions sprayed on potato leaves to ensure per os infection. Feeding on infected leaves at 21-22°C resulted in a 75-100% death rate, with death occurring within one to three weeks. In many cases, however, the virus could not be recovered and the causes of death in many cases (experimental and control) could not be identified. References 2: 1 Ukrainian, 1 Russian.  
[1702-12172]

POLYMERS IN MEDICINE

Moscow VECHERNAYA MOSKVA in Russian 16 Jan 85 p 2

SAMOYLOV, B.

[Abstract] A talk with the director of the Institute of Medical Polymers, G. A. Matyushin, revealed some of the recent advances in the implementation of plastics in medicine. One example consisted of a spray bandage, named 'Lifuzol', which has already found wide application in emergency services and surgical clinics. Further recent developments are plastic containers for storing blood intended for transfusions, instead of the common glass bottles, and self-sealing films applied to sites of incision in surgery which protect from infection and limit bleeding, with the incision made through the film. Other products include special polymeric dressings for burns, as well as special adsorptive preparations for blood purification.  
[196-12172]



## MAIN OBJECTIVES FOR WORKERS IN MICROBIOLOGICAL INDUSTRY

Moscow KADRY SEL'SKOGO KOZYAYSTVA in Russian No 6, Nov-Dec 84 pp 44-49

R. RYCHKOV, Chief of the Main Administration of the Microbiological Industry under the USSR Council of Ministers

[Abstract] Progress in attaining the goals set by the Politburo of the CPSU Central Committee and the USSR Council of Ministers for the Microbiological Industry is reviewed. During the 3 years of the current Five-Year Plan, production in the industry increased by 39.6%; this includes production of feed protein (a 1.6-fold increase), protein-vitamin concentrate (2.1-fold), lysine (1.5-fold) and premixes (13.7%). Production in 1983 increased by 14.4% overall in comparison with 1982, and an increase of at least 10% is set for 1984. Considerable capital was invested in 1981-1984 for the construction of industrial plants for protein-vitamin concentrate and premix production. The investment in 1984 was almost 1.5-fold greater than in 1983. There was an approximately 30% increase in housing construction, which is especially important since 54% of workers in this industry are women. In 1970 more than 9000 workers had completed higher or specialized secondary education, and this number was several times higher for 1984. In 1983 the industry employed more than 2500 scientists; of these 40 had doctorate degrees and about 600 were candidates. More than 80% of these specialized in the fields of microbiology, genetics, molecular biology, hydrolysis and food chemistry technology, and the technology of vitamin and protein production. New technology in the industry required radical restructuring in programs training specialists for the microbiological industry. Specialists and management personnel also continued to improve their education. The workers in this relatively young industry (founded in 1966) are also young; more than 40% were below 30 years of age. Nevertheless, there is a shortage of engineers and technicians. Only 36-40% of such specialists were designated for the microbiological industry by the USSR Gosplan (State Planning Commission). There is also a need to provide new plants with qualified personnel, especially the new facilities in Siberia and the Far East. Two individuals are specifically mentioned: A. V. Pushkov, director of the Svetloyarskiy plant for the production of protein-vitamin concentrates, who achieved one of the highest levels of production for each fermentation unit, and V. R. Vaaks, engineer and manager of the Rechitsa industrial hydrolysis pilot plant (Gomel Oblast). Future goals include the development of an efficient technology for the production of amino acids in crystalline and highly concentrated forms (by 1990 crystalline lysine production will reach 30% of total production), the enzymatic hydrolysis of cellulose raw material with its subsequent enrichment with proteins, creation of safe bacterial fertilizers containing nitrogen-fixing microorganisms, and development of feed additives and other biologically active preparations. It is expected that in the near future many microbiological products will be produced by single-cell microorganisms created by genetic engineering.

[179-9307]

ROOT AND AEROSOL POLLUTION BY  $^{137}\text{Cs}$  OF GRASSY VEGETATION IN USSR

Sverdlovsk EKOLOGIYA in Russian No 6, Nov-Dec 84 (manuscript received 20 Dec 83)  
pp 17-24

MAKHON'KO, K. P. and RABOTHOVA, F. A., Institute of Experimental Meteorology

[Abstract] A study of root and aerosol pollution of grassy vegetation in the USSR by  $^{137}\text{Cs}$  from fallout from nuclear explosions is described and discussed. Noticeable entry of radionuclides into objects of the environment began in 1954 with the beginning of thermonuclear testing. Aerosol pollution of the vegetation by  $^{137}\text{Cs}$  changed greatly from 1959-1960; it peaked in 1959 and 1963 but dropped in 1963 after the 1963 Moscow agreement to stop testing nuclear weapons. Root pollution by  $^{137}\text{Cs}$  increased rapidly up to 1963, then slowed and remained at about the same level until 1974. Aerosol pollution of vegetation was high until 1966 and then declined gradually by the beginning of the 1980s, with an increase after nuclear tests by the Chinese Peoples' Republic. Average coefficients of  $^{137}\text{Cs}$  accumulation of grassy vegetation in 7 types of soils are presented and discussed. Maps presented and discussed include: map of root pollution of grassy vegetation by  $^{137}\text{Cs}$  after 1963; map of relative aerosol pollution of grassy vegetation by  $^{137}\text{Cs}$ ; map of overall pollution of grassy vegetation by  $^{137}\text{Cs}$  in 1963 and map of total pollution of grassy vegetation by  $^{137}\text{Cs}$  in 1981. Change of the fraction of aerosol pollution by  $^{137}\text{Cs}$  in time because of deflation of its pollution in the total area was shown for: semi-desert areas of Kazakhstan and Central Asia, arable lands of Kazakhstan, Ukrainia and the Moscow region. The percentage of secondary aerosol pollution due to radioactive dust carried by the wind was greatest by far in the semi-desert zone while it was relatively low in the other areas studied (less than 11 percent). Figures 7; references 18: 16 Russian, 2 Western.  
[1031-2791]

# ACCUMULATION OF $^{137}\text{Cs}$ IN FOOD FISH IN COOLING WATER RESERVOIR OF BELOYARSKIY ATOMIC POWER STATION

Sverdlovsk EKOLOGIYA in Russian No 6, Nov-Dec 84  
(manuscript received 4 Apr 84) pp 36-40

TRAPEZNIKOVA, V. N., TRAPEZNIKOV, A. V. and KULIKOV, N. V., Institute of Ecology of Plants and Animals, Ural Scientific Center, USSR Academy of Sciences

[Abstract] Results of a comparative study of  $^{137}\text{Cs}$  accumulation in basic species of food fish: roach (*Rutilus rutilus*), bream (*Abramis brama*), pike (*Esox lucius*), tench (*Tinca tinca*), crusian carp (*Carassius auratus gibelio*) and carp (*Cyprinus carpio*) in the Beloyarskiy reservoir, used as cooling water for the Beloyarskiy Atomic Power Plant were presented and discussed. Higher  $^{137}\text{Cs}$  concentrations and therefore higher accumulations were noted in the predatory fish, pike. This indicator decreased in the other species in the sequence tench, crusian carp, roach, bream and carp. Difference in  $^{137}\text{Cs}$  accumulation in the various species were due to food patterns and to differences of age of individuals studied. Differences in  $^{137}\text{Cs}$  accumulation in the species studied were found also in fish caught in recent years in the upper reaches of the reservoir 1517 km from Teplaya Bay but they were found in lesser amounts. Concentrations of  $^{137}\text{Cs}$  in the waters of the reservoir varied greatly with time, decreasing by almost one order of magnitude from 1980 to 1982, while levels of the radionuclide in the fish in this time were practically unchanged or decreased very slightly. Concentration of  $^{137}\text{Cs}$  in roach caught in the area of release of heated water in Beloyarskiy reservoir exceeded by one order of magnitude the levels found in roach caught in Reftinskiy reservoir. The  $^{137}\text{Cs}$  level in both the water and in the food fish in Beloyarskiy reservoir were within the limits for human safety. Figures 2; references 15: 11 Russian, 4 Western.  
[1031-2791]

UDC 591.4:599

## ECOLOGICAL AND PHYSIOLOGICAL CHARACTERISTICS OF SMALL MAMMALS

Sverdlovsk EKOLOGIYA in Russian No 6, Nov-Dec 84  
(manuscript received 10 May 84) pp 40-44

BASHENINA, N. V., Moscow State University imeni M. V. Lomonosov

[Abstract] Study of the weight relationship of the kidneys and heart (kidney/heart index) in 23 species of small adult and young mammals (Insectivora, Rodentia, Lagomorpha) showed this index to be more closely related ecologically than taxonomically for the mammals studied. The animals were grouped according to the kidney/heart index: group 1- less than 100 percent, group 2- 90-120 percent and group 3- 130 percent or more. The index increased with an increase

of weight of the kidney (in Ochotona, Microtus oeconomus) or a decrease of the weight of the heart (some voles) and is decreased in mammals with a large heart (Sorex, Tamias). Placement of a species in the overall scale of kidney/heart index changes was not always possible nor were causal relationships in these changes determined precisely. The index can be used to compare animals of different size and may be used in determining ecological-morphological and ecological-physiological characteristics of species.

Figure 1; references 11: 10 Russian, 1 Western.

[1031-2791]

UDC 577.41/.46

#### BIOTIC FACTORS IN TURNOVER OF SUBSTANCES IN TERRESTRIAL ECOSYSTEMS

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[Abstract] A survey of the literature showed that turnover and mineralization of substances in natural ecosystems is predominantly due to biogenic processes with abiogenic factors playing a very minor role. Human economic activity increases the role of abiogenic factors in these processes. Natural and anthropogenic ecosystems differ in the relationship of biotic and abiotic factors in the turnover of substances with the importance of abiotic factors increasing in proportion to the increase of human activity in the system. Experiments were performed to check the cellulosolytic activity of fallen vegetation under the effect of inhibitors of microbiological activity (toluene, sodium azide, mercuric chloride). Boxes containing 5 g of dry fallen oak leaves or grasses to which were added 5 ml (to oak leaves) or 10 ml (to grasses) of toluene of a 0.02 percent solution of mercuric chloride were compared to boxes containing fallen vegetation moistened by corresponding amounts of water. Cellulosolytic activity was determined in relation to carboxymethyl-cellulose or monocrySTALLINE cellulose. Cellulosolytic activity of plant residues processed by the inhibitors was much higher than that in the control. It was 2-10-fold higher in samples processed by toluene and 1.2-4-fold higher in samples processed by the other inhibitors in comparison with figures for the control. Figures 2; references 17: 14 Russian, 3 Western.

[1031-2791]

## ENVIRONMENT

### BRIEFS

WATER POLLUTION INDICATORS--Pushchino--The extent of a water body's toxicity can be judged by changes in the heartbeat of Daphnia, a midget water flea one to two millimeters long. Daphnia live in stagnant and slowly running fresh water bodies and serve as food for small fish and fry. Daphnia are cultivated at fish breeding farms. But not everyone knows that this unpretentious miniature crayfish is unusually sensitive to pollution of its habitat, which is why it has become an obligatory object in the course of establishing the amount of pollutants in waste water. I found out about all of this after a visit to the Biophysics Institute of the USSR Academy of Sciences. "How does one get operative information about the status of the habitat of living organisms?", I was asked again by a scientific associate of the Institute, candidate of biological sciences G. S. Kiknadze. "And here we can do it, even if we have the help of a control -- the heart of the Daphnia." The scientist took the tiny crayfish out of the aquarium with a pipet and transferred it with a small amount of water into glass tube five millimeters in diameter which gradually narrows from one end to the other. After the Daphnia swam to the middle of the tube, it fell into a runaway trap. The secured object is then placed under a microscope and is supplied with continuously running water. There the optical system is tuned in on the heart. A ten-fold magnification clearly shows the pulsing of an orange tiny spot. The heartbeat is simultaneously recorded on an oscilloscope and an automatic recorder. "We have a normal, usual hearbeat," observed Goergiy Sergeyevich as he followed the light signals on the oscilloscope screen. "How many beats a minute?", I asked. "Six hundred." A half hour passed. There were no deviations from the norm. Then the scientist changed the water flow to a weak solution of a phenol compound that is often present in sewage. The "cardiogram" was then resumed. "Watch carefully," the scientist said with anticipation. Five to eight minutes passed, and the indicator of the automatic recorder seemed to get "nervous" and the running line on the instrument screen began to take a different shape. "The heartbeat rate is changing," explained Georgiy Sergeyevich, and added further, "it is now beating 400 times a minute." The experiment continued. A higher concentration of toxic substances was added to the solution. The heart began to beat even slower -- 250 times a minute. The concentration could not be made any greater since this would lead to complete cardiac arrest. Once again the tube was connected to running water, and after eight minutes the hearbeat rate returned to normal. [By A. Narimanov] [Text] [Moscow LENINSKOYE ZNAMYA in Russian 6 Jan 85 p 4] 6289

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EFFECTS OF AIR POLLUTION ON BIOLOGICAL ACTIVITY OF SODDY-PODZOLIC SOILS

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[Abstract] Soddy-podzolic soils were assessed for their biological activity in relation to air pollution, using as criteria of activity microbial enumeration, enzymatic activity, and cellulose degradation. In general, regions with pollution due primarily to heavy metals and toxic oxides were characterized by depressed levels of biological activity, while air pollution by organic compounds (phenols, hydrocarbons, etc.) resulted in increased activity in the upper strata. The latter phenomenon was ascribed to selective growth of microorganisms capable of utilizing the organic pollutants. References 20: 17 Russian, 3 Western.  
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RESULTS OF NEW STUDIES OF ENDEMIC TULAREMIA FOCI IN USSR

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[Article by N. G. Olsuf'yev, Institute of Epidemiology and Microbiology imeni N. F. Gamaleya, USSR Academy of Medical Sciences, Moscow]

[Text] Dedicated to the bright memory of our dear teacher, Academician Ye. N. Pavlovskiy, in connection with the 100th anniversary of his birth (1884-1984).

Comprehensive studies of endemicity of tularemia, which have been pursued on the basis of the teaching of Ye. N. Pavlovskiy concerning endemic diseases of man, are among the most important achievements in investigation of this infection in the USSR. We do not know of any work being pursued on such a scale in other countries. Some of the results of our work were published in 1977 [29], but new data have been accumulated since then, which enlarge substantially upon those previously reported, and there is justification for discussing them.

The biocenotic structure of tularemia foci was defined on the model of a field and meadow site of tularemia in the southern part of Moscow Oblast, in the studies of the Tularemia Laboratory (B. P. Dobrokhotoy et al.). In the past, the common vole, *Microtus arvalis* Pall. was considered to play the leading role in field and meadow sites. But it has now been learned that there are two species of voles in meadow and field foci, *M. arvalis* and its twin species, the East European vole, *M. rossiaemeridionalis* Ogn. The first species inhabits chiefly fields and meadows, while the second one inhabits brush-covered gullies, thickets of tall weeds, etc., in the summer, whereas in the winter it settles in stacks of straw, ricks and stacks of hay. Both species are equally sensitive to tularemia and are involved similarly in epizootics of this infection. But the epidemiological significance of the two species is not the same. It is greater for *M. rossiaemeridionalis*, with which local residents have close contact during wintertime work (threshing, using straw and hay, etc.).

The continuous existence of the site in question was observed from 1938 to 1983, i.e., for 45 years, which is indicative of its great stability. Many *Dermacentor pictus* ticks inhabited the territory of the site in question in

prewar and early postwar years (1946-1949), and the regular detection of *F. tularensis* in them was interpreted as evidence of the prime involvement of this arthropod in preserving the site. In subsequent years, there were some changes in agriculture and livestock farming, and there was drastic reduction in number of ticks. Nevertheless, the continuous existence of the site continued. In years with a large vole population, presence of infection in the site was confirmed by frequent isolation of pathogen cultures from sick animals or their carcasses, and in years of its depression usually lasting 2-3 years, by detection of tularemia antigen in bird pellets. Continuity of circulation of *F. tularensis* in the site is apparently due primarily to relay-type transmission of acute or chronic form of infection of voles through contact with the animals (see below).

Inoculations against tularemia are given to the local rural inhabitants, and no cases of the disease have been observed among them for several years.

The eastern steppe endemic tularemia site in Chita Oblast was submitted to comprehensive investigation [27], but its biocenotic structure remained unclear. On the basis of the results of an epidemiological and epizootiological screening covering more than 20 years (1957-1978), tularemia was found in 23 out of the 30 rayons of this oblast. It was shown that the main carriers of the infection are the Daurian pika, Brandt's vole and narrow-skulled vole, which are referable to mammals that are highly sensitive to tularemia. The first two species were mentioned for the first time as carriers of tularemia infection. In this respect, the studied type of site differs drastically from the steppe sites in European USSR, where house mice and common voles play the leading part in circulating the infection. For the first time also, the Daurian pika was classified in the experiments of L. A. Mizitova [27] in group I--animals highly sensitive to tularemia (according to the classification of N. G. Olsuf'yev and T. N. Dunayeva). A large number of cultures of the pathogen was isolated from *Dermacentor nuttalli* ticks, which is indicative of their involvement in circulation of the pathogen at the site. Spontaneous *F. tularensis* infection was demonstrated for the first time in five species of fleas referable to the local fauna. On the whole, the site is defined as epidemiologically inactive, as indicated by the relatively rare cases of recorded tularemia among humans over a period of several years (8 cases in all) and relatively low percentage of individuals with positive sero-allergic reactions for this infection, an average of 2.3% in a retrospective screening of the indigenous population. In this respect, the site under study also differs from the steppe sites in European USSR, which were epidemiologically quite active in prior years when mass scale inoculation was not practiced.

There have been considerable advances in the study of tularemia sites of the tundra type in the Polar region. Cases of tularemia among humans, which are indicative of autochthonous endemic sites of infection, began to be recorded in the Polar region only in postwar years. They were found from the Kola Peninsula in the west to Chukotka in the east and to Taymyr in the north [8, 17, 22, 28, 29, 39, 41, 43]. A random screening was made of indigenous residents, using sero-allergic tests, who had not been previously inoculated, from the northern part of Tyumen Oblast to the north of Magadan Oblast [16, 28]. As a result, there was retrospective demonstration of tularemia infection in 9-



20% of the individuals at all tested points, including the extreme one on the eastern side of the continent, Uelen (Chukotsk Autonomous Okrug). A screening of reindeer in Tyumen Oblast, which grazed in the tundra, revealed 0.8-21.% positive agglutination and passive hemagglutination tests (AT, PHAT), and this was the first finding in this species [16].

A comprehensive epizootiological and epidemiological study of a tularemia site of the tundra type was made in 1972-1978 in Khatangskiy Rayon of Taymyr Autonomous Okrug [2]. In the tundra zone, several cultures of *F. tularensis* were isolated for the first time from the Siberian lemming (*Lemmus sibiricus* Kerr.), and in the forest-tundra zone--from Middendorff's vole (*Microtus middendorffi* Pol.). Spontaneous tularemia in the Arctic lemming (*Dicrostonyx torquatus* Pall). was first discovered (by isolating a culture of the pathogen) in 1976 in the tundra along the lower reaches of Olenek River in northwestern Yakutia [14]. In both Taymyr and Yakutiya, the lemming epizootics coincided with years of high populations of these animals. We should mention isolation of cultures of tularemia pathogen in the Khatanga site from samples of water in the substrate close to lemming burrows, even in years with depressed population size of these animals (following a rise). Experimentally [2], it was shown that the pathogen persists in samples of lake water at temperatures of 4 to 6°C for up to 6 months and in frozen water, at temperatures of -4 to -6°C, for 9.5 months. The obtained experimental data confirm the observations of other authors, already known from the literature, concerning the time of persistence of *F. tularensis* in water, and they are indicative of the definite involvement of the water factor in preserving populations of the pathogen in the environment at high latitudes. A distinction of the tundra type of tularemia site is that there are no *Ixodes* ticks, which are important in transmission of infection in some sites of other types.

Using the antibody neutralization test (ANT), bird pellets and mummified rodent carcasses were examined at the Khatanga site, and tularemia was found in up to 52.5% of the cases in some years [2]. In the agglutination test, antibodies were demonstrated in reindeer (5%), dogs (15.8%) and, for the first time, in Arctic foxes (47.9%); the latter, as we know, feed willingly on lemmings. On the whole, these studies revealed wide distribution of tularemia epizootics among populations of tundra rodents on Taymyr. Finally, a sero-allergic screening of local inhabitants for tularemia revealed positive reactions in an average of 21.1%, which coincides with the data of L. I. Nekrasova [28]. This is indicative of epidemiological activity of the site, but in the years of observation no new cases were recorded, although inoculations were not given.

In 1973, against the background of a rise in number of lemmings, an intensive tularemia epizootic was demonstrated serologically, using the ANT on bird pellets and rodent carcasses on Yugorskiy Peninsula (near the village of Amderma), Yamal and tundra along the lower reaches of Olenek River in northwestern Yakutia [14, 21, 25]. In Yamal, there were cases of tularemia among humans. These data confirmed once more the wide distribution of endemic tularemia sites in the tundras of Eurasia, and that there were synchronous epizootics over large territories.

Data referable to endemicity of tularemia in Kazakhstan were summarized for the first time [1]. The significance of this infection to that region is due to the fact that endemic sights have been demonstrated to date in 17 out of the 19 oblasts making up this republic, whereas according to records, a total of 8932 cases of tularemia among humans occurred between 1926 and 1977. Sites referable to four landform types were found in Kazakhstan: foothill-brook, floodplain-swamp, tugay [vegetation-covered bottomland] and steppe. One should approve of use of the most reasonable classification proposed in our country for the types of sites on the basis of landform. A comprehensive landform-epidemiological survey is provided for each type of site as related to administrative territories (and for mountain systems for the foothill-rivulet sites). The distribution of endemic sites for tularemia in Kazakhstan according to type is illustrated with a diagram-map, which has been published for the first time and is of great theoretical and practical interest. The floodplain-swamp type is the most widespread and the tugay type of site, the least. There are considerable expanses of deserts and steppes that are virtually free of endemic tularemia sites. It is important to stress that it was possible to discover endemic sites by means of thorough inspection using special detachments in several oblasts of this republic where tularemia had not been known.

Much experimental work was done to determine susceptibility and sensitivity to tularemia infection of some species of the mammalian fauna of Kazakhstan: Cape hare [*Lepus capensis* L.], small five-toed and northern three-toed jerboa, medium-sized suslik, Altay, long-tailed and Himalayan marmots, and forest dormouse. The sensitivity to tularemia infection of these species had not been studied or was unclear. In particular, the high susceptibility, sensitivity to infection and distinctions of pathogenesis of tularemia had been studied comprehensively for the first time in the Cape hare (group I), which is widespread in Kazakhstan and had been repeatedly reported as the source of human infection. Experiments with *Dermacentor daghestanicus* Olen. and *Rhipicephalus pumilio* Pom. ticks, which are parasites of Cape hares and other mammals in the tugay sites, dealing with transmission of tularemia infection merit attention; these tick species, which are spontaneously infected with the pathogen of tularemia, have been often found in Kazakhstan. A comprehensive study of numerous strains of *F. tularensis* isolated in Kazakhstan from wild animals and man made it possible to demonstrate, along with typical strains, some that are different in a number of characters, which the author described as a new subspecies of *Francisella tularensis mediasiatica* Aikimbaev, 1966. Strains of this subspecies are inherent in the tugay type of site. Of great interest are data concerning prevention of tularemia in Kazakhstan. It is based on inoculation of the public with live tularemia vaccine. Morbidity was still significant in 1950-1955 (2258 cases in 1954), but in subsequent years, as vaccination coverage increased, it dropped appreciably and became sporadic after 1968, with no cases reported in some years (1959, 1975).

The attention of researchers was drawn to the problem of tularemia on the BAM [Baykal-Amur Railroad]. In postwar years, before construction on this line had started, sporadic cases of tularemia among humans had been recorded in Khabarovsk Krai, and retrospective sero-allergic screening revealed positive tests in a small number of people (3-4%, seldom more); finally, over a period of several years 60 cultures of the pathogen were isolated in a test of many small mammals, Ixodes ticks and other objects [6]. Subsequent studies right in the region of BAM construction confirmed the existence of endemic tularemia

sites and their low epizootiological and epidemiological activity. Thus, an analogous retrospective screening of the indigenous population in the section from Urgal on the west to Komsomolsk on Amur on the east, individuals with positive reactions (about 4%) were found in all of the settlements in the inspected zone [18]. In some areas, cultures of *F. tularensis* were isolated from rodents--northern redbacked and Evoron voles, as well as *Ixodes* ticks and water [19, 20]. The opinion was voiced that the endemic sites in the eastern part of the BAM and in the Amur region in general are referable to the forest type. Investigation of endemic tularemia sites resulted in isolation of cultures of the pathogen from rodents in the western parts of BAM, in particular, in a previously known sites, in muskrats, in the Severo-Baykalskiy Rayon of Buryat ASSR [47], and in a newly found site, in voles, in the Muysko-Kuandin basin of Buryat ASSR [10]. For the first time, a tularemia culture was isolated from the northern pika (*Ochotona hyperborea* Pall.) in the Selezdzhinskiy-Bureya section of the BAM route; the PHAT revealed antibodies to *F. tularensis* in three cases, in washings from the chest cavity of pikas [7].

In view of the detection of endemic tularemia sites in East Siberia, an experimental study was made of sensitivity to infection of *Microtus* reed voles, which are numerous in many parts of the republic. Previously, this had been determined for the *Microtus fortis* Buchn. reed vole, and it was determined that this species has low sensitivity to tularemia (group II) [5, 42, 46]. We additionally tested four similar species: *M. mujanensis* Orl. et Kov. was found to be highly sensitive (group I), *M. maximowiczii* Schrenk (3 chromosome forms), *M. evoronensis* Kov. et Sok. and *M. sakhalinensis* Vassin had low sensitivity [32-34]. A study was also made of *M. fortis* michnoi Kastsch. which was found to belong in group I, in contradiction to the data of N. M. Busoyedova and others [5, 42, 46]. Additional studies are needed to elicit the reason for this discrepancy. The presence of species among the gray reed voles that are not sensitive to tularemia is an interesting exception among the numerous representatives of the genus *Microtus* that are highly sensitive to infection. It is quite probable that the low epizootiological and epidemiological activity of endemic tularemia sites in the Soviet Far East, including the BAM zone, is related to some extent to the fact that voles with low sensitivity to tularemia are the background species in some areas.

Let us mention other endemic sites for tularemia discovered in the USSR in recent times. Thus, in eastern Crimea (Kerch Peninsula), cases of tularemia among humans were found in 1951-1952, but the sources of infection had not been investigated. For several years the search for an endemic site was unsuccessful and the opinion prevailed that there is no permanent site in Crimea. However, in the spring of 1978 an endemic tularemia site was found on Kerch Peninsula; 28 cultures of the pathogen were isolated from voles, mice and other mammals, as well as *Ixodes* ticks and other objects [9].

On Kamchatka, an earlier retrospective sero-allergic screening of the indigenous population yielded positive results among individuals in five regions of this oblast, and in one settlement a culture of the pathogen was isolated from the Norway rat. In 1980, an epizootiological survey resulted in isolation of cultures of *F. tularensis* in the suburbs of Klyuchi from the muskrat and root vole, thereby providing definitive evidence of existence of an endemic site for this infection on Kamchatka [24].

Tularemia is not inherently distributed in cities. But infection can be carried to them by transmission (through mosquitoes and horseflies) from closely situated sites of the floodplain-swamp type, as had occurred in the past in Astrakhan and Omsk. The suburbs of growing cities, for example, Moscow, Leningrad and others, have some areas with previously formed active tularemia sites [23, 45]. It was suggested that they be called synanthropic or urban sites [30]. They require meticulous epidemiological surveillance, and they must be depressed by general sanitary measures.

New data have been obtained on duration of some endemic tularemia sites. We have already mentioned above that manifestations of tularemia in sites of the meadow-field type have been demonstrable since 1938, for more than 45 years, in the southern part of Moscow Oblast. In Leningrad Oblast, sites of the floodplain-swamp type have been found for 18 years, and the periodic infection of brooks and rivulets is related to this [44]. There are also persistent steppe sites, according to observations in Stavropol Kray [38] and in the south of Ukrainian SSR [4], if the territories of these sites are not submitted to radical alteration.

Soviet researchers have devoted attention to the question of chronic or latent tularemia in highly sensitive rodents (group I) as one of the routes of preservation of the pathogen in endemic sites. The first positive tests on water voles [35], common voles [40] and other rodents were not subsequently confirmed by the checks made by other authors [49], including testing by a commission [15]. The positive results of the tests of the first authors could be attributable to use of strains with attenuated virulence that are not typical of endemic tularemia sites. Recently, another suggestion was advanced--to use animals trapped in the field in infection sites that are already immune in the experiments [37]. This is a speculative conclusion, and the rarity of detection by other authors of water and common voles in the field that are seropositive for tularemia does not confirm it. Let us mention the experiments on guinea pigs and white mice infected with a virulent culture after immunization with live tularemia vaccine [36]; long-term carriers of virulent bacteria were subsequently found among surviving animals. But these experiments are not proper and far from patterns seen in nature, since vaccine strains do not circulate in the environment. It was possible to obtain for the first time chronic tularemia with prolonged persistence of a virulent tularemia pathogen in highly sensitive wild rodents, in experiments on East European, *Microtus rossiaemeridionalis* voles, using the alimentary route for infection with a mixture of live and dead bacteria. The same results were obtained by feeding animals on carcasses of rodents that died of tularemia, i.e., a natural route (necrophagia) [31, 48]. In the latter case, a nonlethal chronic infection was produced in 0.5% of the animals. The surviving voles presented seroconversion and prolonged persistence, up to 313 days (duration of observation period), of the pathogen in viscera, which was associated with nephritis and, in a number of cases, bacteriuria. Persistence of *F. tularensis* in voles that are highly sensitive to tularemia occurs because of the early development of immunological responses to a massive dose of killed antigen, against the background of which there is limited accumulation in tissues of virulent bacteria given simultaneously. When chronic animals with prior tularemia were placed together with healthy ones, the infection was transmitted to the latter, apparently through urine and its intake with feed. The established new facts

may help determine the mechanisms of maintaining (circulation) of *F. tularensis* in endemic sites, even in interepizootic periods, along with other natural routes of transmission of infection.

In the studies of endemicity and of the tularemia problem as a whole on a global scale, investigations dealing with intraspecific taxonomy are very important [50]. The latter comprises three subspecies: holarctic *Francisella tularensis* holarctica Ols. et Meshcher., which is widespread in Europe, Asia and North America and is prevalent in the USSR, the nonarctic *F. tularensis* tularensis (McCoy et Chapin) Ols. et Meshcher. inherent only in North America, and the Central Asian *F. tularensis* mediasiatrica Aikimb. found only in the USSR in tugay sites of the Ili, Chu and Amu-Darya rivers. The subspecies can be differentiated well according to several biochemical characters, pathogenicity, ecology, etc. Recently, additional differences between subspecies were discovered with regard to composition of higher fatty acids [26]. The holarctic subspecies consists of three biovars: Japanese---biovar japonica, erythromycin-resistant---biovar II ery<sup>R</sup>, and erythromycin sensitive---biovar I ery<sup>S</sup>. The first two biovars are distributed only in the Old World, the third has been found in both the Old and New Worlds. Our country has priority in these studies, since Soviet proposals for nomenclature have gained international recognition [50]. Legitimization of the developed taxonomy makes it possible to identify more accurately the strains of *F. tularensis* isolated in different parts of the world.

Development of "Methodological Instructions on Laboratory Diagnostic Tests for Epizootiological Screening of Endemic Tularemia Sites" and "Instructions for Laboratory Diagnostication of Tularemia in Humans" is also a major achievement. Both publications summarize on a modern level the enormous methodological knowhow gained in our country in the many years of investigation of tularemia, and they have been approved by the USSR Ministry of Health.

New diagnostic laboratory tests for tularemia have gained wide use, in particular, immunofluorescence microscopy [3] and erythrocyte diagnosticum; an effective method of demonstrating tularemia antigen was developed on the basis of the latter, for use in sites of infection by using the ANT on bird pellets and droppings of predatory mammals [11, 12]. This method has been successfully tested in the field, in the central belt of European USSR, the Caucasus, Central Asia and other areas in different types of endemic sites [13].

Prevention of tularemia continues to be practiced with success in the USSR, on the basis of extensive use at tularemia sites of inoculations of the public with live tularemia vaccine, in conjunction with eradication of rodents and pasture ticks.

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TULAREMIA ON KOLA PENINSULA

Moscow ZHURNAL MIKROBIOLOGII, EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian No 12, Dec 84 (manuscript received 12 Dec 83) pp 80-83

[Article by Yu. A. Pogorelyy, F. N. Bayluk, N. M. Kuzovleva, Ye. I. Kochetkova and V. A. Shibalov, Murmansk Oblast Sanitary and Epidemiological Station and Leningrad Plague-Control Station]

[Text] For a long time, no endemic foci for tularemia had been found on Kola Peninsula, and their existence was questioned. There are only a few reports on this score in the literature [5, 7, 9]. In view of the intensive development of hinterlands and man's penetration into uninhabited regions, a need arose for comprehensive investigation of this infection in the above-mentioned region in order to validate preventive measures. We submit here data that were gathered during an epizootiological survey of this region in 1982 and results of bacteriological and serological testing for tularemia.

The species composition of rodents on Kola Peninsula is diversified. It is inhabited by the large-toothed redbacked vole (*Clethrionomys rufocanus* Sundeby) and root vole (*Microtus oeconomus* Pall.). The northern redbacked vole (*Clethrionomys rutilus* Pall.) and common redbacked vole (*Clethrionomys glareolus* Schreb.), as well as field vole (*Microtus agrestis* L.) are encountered less often. The Norway lemming (*Lemmus lemmus* L.) is a constant inhabitant of the tundra zone.

As a rule, the number of mouse-like rodents is small on Kola Peninsula--2-3% trapped and only in years of a rise do they constitute 10-20% in some local areas. Peak numbers of Muridae are observed every 4-6 years. Mass scale reproduction of the Norway lemming is also observed at about the same frequency. During years of large lemming populations, they migrate intensively from the tundra zone to the forest belt, up to the northern regions of Karelian ASSR. Migrations last 3-4 months. Peak activity occurs in September. In favorable years, lemmings settle along their migration routes and start to multiply; however, in areas that are not inherent in them, they become extinct in 1-2 years [1]. The last mass-scale migrations of lemmings were observed in 1978 and 1982.

## Material and Methods

A regular search for *Francisella tularensis* in Murmansk Oblast started in the 1960's.

In the fall of 1982, the records show that the number of rodents was above the average figures prevailing for many years, reaching 7.5% caught in traps in some regions. During the same period there was migration of the Norway lemming.

In 1982, mass-scale reproduction of Norway lemmings was observed over the entire territory of Kola Peninsula. In August and September, large numbers of lemmings were encountered in settlements in Pechengskiy, Kandalakshskiy, Kirovskiy, Kolskiy, Lovozerskiy and Terskiy rayons, although the intensity of their migration was lower than in 1957 and 1978.

In the spring of 1982, examination of 124 bird pellets collected in Kandalakshskiy Rayon revealed 2 containing *F. tularensis*, which served as cause for deeper epizootiological inspection of the oblast. The work was done in six rayons: Kandalakshskiy, Kirovskiy, Kolskiy, Pechengskiy, Lovozerskiy and Terskiy.

A total of 460 mammals (156 large-toothed redbacked voles, 62 root voles, 101 bank voles, 72 northern redbacked voles, 3 field voles, 54 Norway lemmings and 12 shrews), 424 ectoparasites gathered from small vertebrates (159 fleas and 265 gamasid mites), 49 rodent nests, 66 water samples and samples of rodent droppings served as material for laboratory tests.

In the vicinity of the village of Nikel, 46 field rodents were caught and 14 biological tests were made. In the vicinity of Kirovsk 12 field rodents were caught and 1 specimen of their droppings collected; 6 biotests were performed on white mice. The tests were performed by group methods. Pieces of organs (spleen, liver, lungs) and lymph nodes from 10 specimens of the same species trapped in the same place were combined and 0.5 ml organ suspension was injected subcutaneously in the posterior right leg of white mice. The organs of experimental animals that had died with the pathoanatomical changes typical of tularemia were used for cultures on McCoy's egg-yolk medium, as well as for the serological fluorescence test (SFT) and precipitation reaction.

## Results and Discussion

In October 1982, a tularemia epizootic was demonstrated for the first time in Kirovsk and village of Nikel in Pechengskiy Rayon, Murmansk Oblast, which was confirmed by isolation of 8 strains of *F. tularensis* (see Table).

All of the strains were isolated by the biological method using biological tests on laboratory animals (white mice), mostly in the first-second passages.

The isolated strains were typical *F. tularensis* with regard to cultural and morphological properties. None used glycerin, all were sensitive to erythromycin and were agglutinated with tularemia serum to a titer of 1:3200. They fermented glucose, maltose, but not lactose, mannitol and saccharose. The cultures were sensitive to neomycin, tetracycline, streptomycin, levomycetin,

oleandomycin and resistant to penicillin, oxacillin and ristomycin. Virulence of the pathogen was tested on white mice and common voles. All animals perished after subcutaneous infection with a dosage of suspension dilution containing one bacterial cell, according to estimates.

#### Bacteriological testing of rodents in tularemia sites in 1982

Source of material	Specimens tested	Material tested		Bio-tests	Strains isolated
		rodents	other		
Near Nikel, Pechengskiy Rayon	Large-toothed redbacked vole	14	-	3	2
	Root vole	17	-	3	1
	Bank vole	10	-	4	2
	Northern redbacked vole	3	-	2	-
	Norway lemming	1	-	1	1
	Shrew	1	-	1	-
	subtotals	46	-	14	6
Near Kirovsk	Large-toothed redbacked vole	2	-	1	-
	Root vole	3	-	1	-
	Bank vole	4	-	1	-
	Norway lemming	2	-	1	-
	Field vole (carcass)	1	-	1	1
	Rodent droppings (specimen)	-	1	1	1
	subtotals	12	1	6	2
Totals		58	1	20	8

The epizootic sites are more than 200 km apart. Both are characterized by very rugged terrain and complex plant associations. The site in the region of Kirovsk is in a forest zone and the one near Nikel is in a tundra zone. No appreciable differences were noted in species composition of rodents in these areas, but there were more Muridae near Nikel with 3.0% trapped and only 0.9% in Kirovsk. Subsequent inspections of the epizootic regions made 2 months after discovery of the epizootics failed to reveal a decline in number of rodents, but no *F. tularensis* were isolated.

In the spring of 1983, work was expanded with respect to epizootiological inspection of Kirovskiy and Pechengskiy rayons. Not only the epizootic regions, but areas 10-30 km away from them were inspected. A total of 122 rodents, 13 nests, 31 water samples and 2 dropping specimens were submitted to laboratory tests. No *F. tularensis* cultures were demonstrated. Using the antibody neutralization test (ANT) on 135 predatory bird pellets, *F. tularensis* antigen was found in 12. There were positive findings in both enzootic regions.

The first reports of tularemia among humans are referable to 1954-1955 [9]. An outbreak of tularemia had been observed among servicemen in the eastern parts of the oblast. Human infection was attributed to use of water from brooks infected with *F. tularensis*. Other researchers believed that infection had occurred from infected hay, which had been brought in from parts of north-west RSFSR enzootic for tularemia [8]. A. A. Maksimov [5] and N. G. Olsuf'yev

[7] expounded the hypothesis that there was local origin of the outbreak, similar to diseases previously described among people in neighboring Scandinavian countries. There, the epizootics occurred against the background of mass-scale reproduction of Norway lemmings. Later on, in the 1960's, it was retrospectively established that the indigenous population had been in contact with *F. tularensis* in Terskiy and Lovozerskiy rayons of Murmansk Oblast. Positive tests for tularemia were recorded in 5.6% of those screened. Blood serum from individuals who had suffered diseases similar to tularemia in clinical symptoms, yielded positive results in some cases with the agglutination test.

The epidemic activity of the discovered endemic sites is low, as indicated by absence of disease among the inhabitants. This could be attributed to the low density of rural population exposed to risk of infection with *F. tularensis*.

In recent years, several works have been published that confirm the independent existence of tularemia sites in the extreme northern part of our country. Epizootics have been found among tundra rodents on Yamal and Yugorskiy peninsulas [4], East Taymyr [2], West Yakutia [6] and Polar East Siberia [3]. The tundra type of endemic site was singled out. At the same time, the environmental conditions of Murmansk Oblast constitute the typical Kola landforms, where there are very defined, intricately associated complexes of tracts that are not encountered beyond its frontiers. The vegetation associations change from arctic tundras to tayga within limited territories. This, in turn, determines the uniqueness of the animal kingdom. Representatives of the tayga and tundra live together in the same biotopes, which presents some difficulties in typing endemic tularemia sites in Murmansk Oblast.

The climate of the polar region, as well as apparently, the sluggish course of epizootics, make it difficult to search for endemic sites. There, intensive epizootics are apparently very rare and their course is rapid. Future studies should be directed toward searching for this infection in other parts of the oblast, particularly in areas where geologists, prospectors, lumberjacks and reindeer farmers work.

### Conclusions

1. In 1982, *F. tularensis* was isolated for the first time in Murmansk Oblast from Muridae rodents, which confirmed the assumption that there were natural foci of tularemia on Kola Peninsula.
2. The tularemia epizootic occurred at a time of mass-scale reproduction and migration of Norway lemmings.
3. The tularemia epizootics had a rapid course.

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HEAVY METAL CONTENT OF CANNED FRUITS AND VEGETABLES

Moscow VOPROSY PITANIYA in Russian No 6, Nov-Dec 84  
(manuscript received 20 Jan 84) pp 65-66

GEL'FAND, S. Yu., MEDVEDEVA, T. N., VDOVINA, Z. N. and MALOFEYEVA, L. N.,  
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[Abstract] Quality control tests were conducted on a variety of canned fruit and vegetable goods produced at various Soviet plants, to determine the levels of heavy metals. Analysis of various pooled samples showed that the levels of copper fell into the 0.3-29.2 mg/kg range, zinc ranged from 0.3 to 17.6 mg/kg, lead from 0.05 to 1.0 mg/kg, and tin from 5 to 200 mg/kg. The products were thus shown to be in compliance with the safety standards accepted by the COMECON countries. References 7: 3 Russian, 4 Western.  
[1734-12172]

STURGEONS IN LENINGRAD

Leningrad LENINGRADSKAYA PRAVDA in Russian 23 Dec 84 p 3

[Interview with Valentina Vasil'yevna Ponomarenko, head of the laboratory of Comparative Behavioral Genetics of the Institute of Physiology, conducted by Z. Manilova, in the column "Science. Goals, Research, Achievements"]

[Abstract] The article presents excerpts from a verbatim account of a conference on the cooperative efforts of members of the Institute of Physiology imeni I. P. Pavlov, USSR Academy of Science, and the collective fishery imeni M. I. Kalinin, managed by Aleksey Nikolayevich Sukhanov, and an interview with V. V. Ponomarenko on the creation of a new fish "beloship," a hybrid between the beluga sturgeon and the spine["ship" in Russian], and its introduction into the Leningrad area. Fish culturists in the Caspian area had a problem: hydraulic structures prevented sturgeons from reaching their spawning grounds, and the construction of fish plants required the study of sturgeon behavior under artificial conditions. Part of this study was the hybridization of various fish species to produce desirable hybrids. The cross between the beluga sturgeon and spine produced the beloship, which, although one of its parents is

a typical southern fish, tolerated northern climates and even somewhat polluted water. In the spring of 1981, a thousand beloship fry were brought to Leningrad for introduction into the warm waters produced by power plants. The beloship also proved to be a profitable fish, since it did not require special and expensive feed as is the case with carp and trout. An adult beloship weighs 16-18 kg and produces caviar reputed to be equal to black caviar.

[176-9307]

## GENETICS

### GENE 'EXPLOSIONS': FACTS AND HYPOTHESES

Moscow APN DAILY REVIEW in English 24 Jan 85 pp 1-4

[Article by V. Ovcharov, TASS correspondent]

[Text] News that Soviet scientists have identified "transpositional explosions" of unstable genes came as a bombshell to geneticists. The Moscow Vavilov Institute of General Genetics, where the sensational discovery was made, is now being bombarded with letters.

On the desk of Tatiana Gerasimova, Candidate of Biological Sciences, who is head of the mobile genes group, is a neat pile of reprints of Reports by the USSR Academy of Sciences and an article, which was also published in London's NATURE and other publications. Next to it lies a sheaf of envelopes and a list of more than 200 addresses.

"Letters are no problem, though they do take a lot of time," she says. "What is really difficult is to provide the up-to-date material asked by many."

In a special room are arranged test tubes containing the remarkable *Drosophila* fruit flies, the likes of which cannot be found anywhere else. Gerasimova immobilises one with ether and places it under a microscope. I peer into the eyepiece and see very distinctly the effects of a gene "explosion." Unlike its "parents," the insect has triangular wings, rather than round-shaped.

It has taken a team of scientists from the Institute of General Genetics and the Institute of Molecular Biology several years to produce what is now lying before me.

"The discovery of 'transpositional explosions' reads like a detective story," says Gerasimova. "All genes, which are parts of DNA responsible for transmitting hereditary information, are stable. They sit snugly on the rodlike chromosomes, each in its own niche. A long-held view has been that it is disturbances in these genes which produce changes in proteins and, consequently, in traits of the organism: eye and hair color in humans or wing shape in *Drosophila*. Classic genetics deals precisely with such genes."

It was presumed, however, that not all genes kept to their sites on the chromosome. Scientists suspected the existence also of unstable genes, which



for an unknown reason might start traveling down the chromosome. The supposition was that by incorporating themselves into the stable genes of parent sex cells, they brought about mutations in offspring. Like mutations caused by X-rays or chemicals. The nature of the new kind of mutations is, however, different. These are genetic mutations.

Early in the 1950's this hypothesis was confirmed by B. MacClintock, [of the United States], on maize genes, while in 1976 the unstable elements were discovered at molecular level by G. Georgiev, USSR, and at the same time by D. Hogness, [of the United States]. Even the skeptics seemed convinced, only to regain their doubts when research began into the movement of these genes.

"The door was pried open," continued Gerasimova, "by a technique of gene manipulation. When wild *Drosophila* are mated with laboratory specimens, mutagenesis occurs. The germ cell undergoes changes, and the progeny develop features absent in parents. Scientists have long known this. What they did not know, and for a long time, was the mechanism of this phenomenon. Now, following hundreds of carefully planned experiments we know that mutagenesis is triggered off by these unstable genes."

Interest focused on one such gene found not long previously in the genome (genetic apparatus) of wild *Drosophila*. It appeared to be able to "snip itself out" of the chromosome and, after a mating, to move along the embryo's chromosomes and find a new site for itself, with a resultant mutation. Scientists made it into their manipulating tool.

Experiments that followed brought to light one essential thing: the process is avalanche-like, with not one or two, but almost all mobile genes available in the organism's genome, rushing away from their places, rushing simultaneously, explosively. Such cataclysms in genes have come to be known as "transpositional explosions."

The significance of the finding can be appreciated if we recall that unstable genes make up between 5 and 15 percent of the genome of different organisms. During the "explosion" the genome sort of shuffles itself like a pack of cards. The "explosion" is not just another variability factor among others known to science. It helps to produce an individual with many new traits. But does this occur in nature?

"It does and very often," believes Gerasimova. "The traces of 'explosions' should be sought at interfaces between natural populations, where habitats of different strains overlap. While inside a population the genome is stable, at its margin some surprising varieties may appear. Now we can put a finger on the probable culprit--the 'explosions.'"

"But can such 'explosions' produce new species of animals?" I wondered.

"I think it is too soon to draw such far-reaching conclusions, although the major rearrangements caused by the "explosions" suggest such a possibility. It has been noticed, for example, that new species appear where different areals meet. But scientists still have difficulties explaining the origin

of new species. Today's theory inclines to the view that the process is not gradual, but one involving explosion-like mutations. The gene 'explosions' offer here wide scope for supposition."

"And still it is not clear what touches off a 'transpositional explosion?'"

"In our experiments it was a mobile gene of one individual acting on the genome of another. The role of natural conditions is, however, far from well established. I think it is major changes in the biosphere that act as a triggering mechanism. There have been many in the past, but their number is especially great today, what with human interference with the environment. One thing we know today is that mobile genes are a good tool for modifying that part of DNA which is of most interest to us. Our next target is to learn to manipulate this tool."

As a corollary, we asked Doctor of Biological Sciences L. Korochkin, a leading geneticist and laboratory head at the Koltsov Institute of Developmental Biology, to comment on the news.

"Gerasimova and co-workers from the laboratory of G. Georgiev, corresponding member of the Soviet Academy of Sciences, have made a fundamental discovery," he said. "It will change appreciably our ideas in genetics and above all our understanding of mutagenesis, the process of hereditary change. Until recently the view has been that any mutation is spontaneous and rare and results from one nucleotide in the genome replacing another. The class of mutations, which Soviet scientists have discovered and which is called 'transpositional explosions,' is a new one. It describes the simultaneous, multiple and slightly directional motion of unstable elements within the genetic material, at a high rate at that. As a result, the hereditary apparatus undergoes change. Such events can markedly modify the organism's structure and physiology.

"What is especially important is that all this follows the incorporation of a definite sort of mobile elements in the genome. The discovery, and this is the main point, opens up new vistas in genetic selection. Specific units isolated in plants and animals and conducive to genome rearrangement can furnish breeders with a powerful tool. It is not ruled out that this tool may help to engineer new organisms having a required combination of useful properties.

"The results are also important for the evolutionary theory. The 'transpositional explosions,' being rather common, perhaps play the prime role in the explosive formation of species, giving rise to new groups of organisms."

(IZVESTIYA, January 22.)

CSO: 1840/1723

'GENES OF CREATIVITY' VERSUS 'CANCER GENES'

Moscow PRAVDA in Russian 24 Dec 84 p 7

FRANTSEN, O.

[Abstract] The controversial report by D. Baltimore and H. Temin in 1970 that RNA can serve as a matrix for the synthesis of DNA prompted the late V. A. Engel'gardt, director of the Institute of Molecular Biology, USSR Academy of Sciences to organize a large-scale project for the isolation and study of the enzyme responsible for this process, which he named "revertase" [= reverse transcriptase]. The project, also called "Revertaza" [Revertase], represented the cooperation of scientists in the fields of molecular biology, enzymology, virology, genetics and other areas from Novosibirsk to East Germany and Czechoslovakia. By 1978 the enzyme had been thoroughly analyzed and used as a fine instrument in genetic engineering and in the synthesis of artificial genes, a synthesis which now could be completed within several weeks. The project also provided information on the intrusion of viral DNA into a cell's genome. This process was implicated in the etiology of cancer in that segments of the cell's own DNA, i.e., oncogenes or cancer genes, were turned on by tumorigenic viruses, harmful chemicals or radiation and changed normal cells in cancerous tissue. In 1981 another All-Union project "Onkogen" [Oncogene] was begun under the aegis of the USSR Academy of Sciences and the USSR Academy of Medical Sciences. The project was headed by G. Georgiyev, a fellow worker of Engel'gardt. Engel'gardt himself continued to be interested in the project's progress until his death. He left the legacy of the "genes of creativity" to counteract the cancer genes. About a third of the "Onkogen" project is now

completed. Latent and active oncogenes have been identified in many human tumors, and an oncogene bank has been established. An interesting discovery was the existence of small, mobile genes what can insert themselves into oncogenes and render them inactive.  
[178-9307]

PREVENTION OF EYE FATIGUE IN COLOR DISCRIMINATION BY ELEUTHEROCOCCUS AND SCHIZANDRA CHINENSIS EXTRACTS

Moscow GIGIYENA I SANITARIYA in Russian No 12, Dec 84  
(manuscript received 2 Apr 84) pp 7-9

SOSNOVA, T. L., GOLUBEV, V. V., PLEKHANOVA, N. A. and AFANAS'YEV, A. N.,  
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[Abstract] Extracts of Eleutherococcus and Schizandra chinensis were tested for 40 days on 18-30 year old women engaged in occupational tasks (visual control of semiconductors) requiring color distinction. The Eleutherococcus extract was administered in a dose of 2 ml with 30 ml of water, while Schizandra was employed as a 10% tincture given at a rate of 30 drops/day. Tonic effects of the extracts were reported within a few days of administration, and both preparations were effective in lessening fatigue, enhancing color discrimination, and in improving efficiency and productivity. On an overall basis, Eleutherococcus improved visual spectral sensitivity to red, green and blue colors by 95.5%, and Schizandra by 92.5%. The improved color sensitivity of the workers persisted for 2 to 2.5 months after intake of the extracts was discontinued. Figures 1; references 6 (Russian).  
[1735-12172]

IMMUNOGLOBULIN MOLECULES AS PRECURSORS OF NATURAL IMMUNOREGULATORS

Riga DOKLADY AKADEMII NAUK LATVIYSKOY SSR in Russian No 12, Dec 84  
(manuscript received 1 Oct 84) pp 93-102

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[Abstract] A general discussion is presented of the immunoglobulins as a potential source of various immunoregulatory factors, including the putative mechanisms of their formation. The latter is proposed to consist of limited proteolysis of the peptide chains, and subsequent quasicyclization. Analysis of amino acid sequences in immunoglobulin peptide chains and identification of potentially reactive amino acid moieties led to the identification of sequences that might constitute active peptides. Confirmatory studies involved synthesis of such peptides and testing in spontaneous rosette formation with sheep RBCs. These studies showed that the peptides in question (IgG: 345-349, Glu-Pro-Gln-Val-Tyr; IgM: 451-455, Arg-Pro-Asp-Val-Tyr; IgE: 430-435, Ala-Ala-Pro-Glu-Val-Tyr; IgA: 347-351, Arg-Pro-Gln-Val-His), designated immunoetins, possess activities similar to those of thymopentine and levamisole. The actual in vivo synthesis and activity of such factors remains to be established. Figures 7; references 14: 6 Russian, 8 Western. [1721-12172]

ACHIEVEMENTS AND PROSPECTS IN PROTEIN AND PEPTIDE CHEMISTRY AND BIOLOGY

Riga IZVESTIYA AKADEMII NAUK LATVIYSKOY SSR in Russian No 12, Dec 84 pp 3-10

CHIPENS, G. I.

[Abstract] Recent advances in protein and peptide studies have seen the development of the informone concept, a term used to designate various metabolites functioning as cellular signal factors. The vast majority of such factors are either peptides or proteins and, hence, studies on their modification are of special interest. Such studies now constitute the main research interest of the Department of Peptide-Protein Bioregulators at the Institute of Organic Synthesis of the Latvian SSR Academy of Sciences. A number of interesting observations have been made with cyclic peptides, for example. Cyclization

of various peptides prolongs their effective action in many cases, enhances tissue specificity, and in other situations leads to the appearance of novel and unexpected biological effects. For example, cyclic angiotensin analogs act as hypotensives, while bradykinin cycloanalogs have hypertensive properties. Similarly, cyclic tuftsin analogs act as tuftsin antagonists. Novel immunoregulators have been discovered, such as rigin, which is derived from the region connecting the C<sub>H</sub>2 and C<sub>H</sub>3 domains in IgG. Rigin enhances the phagocytic activities of both the macrophages and polymorphonuclear leukocytes. Quasi-cyclization and proteolysis of immunoglobulins led to the preparation of immunopoiectins, factors which stimulate T cell development and differentiation. Using a similar approach ingertsin [sic] has been prepared from IgE, a factor involved in the evolution of allergic manifestations. It is anticipated that the key focus of research in the coming 12th Five Year Plan will be on immunoneuropeptides, and their function in mediating interactions between the neuroendocrine and immune systems. The formation and fixation of quasicyclic structures in natural peptides and proteins will greatly facilitate detection and preparation of novel bioregulatory molecules. For greater and more rapid practical application of such discoveries it will be necessary to establish a new administrative unit concerned with the production of these factors in quantities suitable for medical, veterinary and toxicological screening.

References 24: 15 Russian, 9 Western.

[1721-12172]

## LASER EFFECTS

### BRIEF

LASER PROPERTIES STUDIED--Institutes in Moscow and Kiev are studying a biostimulator which uses the curative properties of the laser. The apparatus was developed by a group of colleagues from the Moscow Institute of Radio Engineering, Electronics and Automation. Having embarked ten years ago on the development of a biostimulator, the scientists posed themselves a difficult task; developing an apparatus capable of relieving emotional tension and improving the mental state and the memory of people whose work induces great emotional stress. What if biostimulators are used for curative purposes? The laser beam acts on the reflector points by impulse. To some extent this duplicates acupuncture, but the laser has undoubted advantages over it. [Text] [Kiev PRAVDA UKRAINY in Russian 24 Jan 85 p 4] 12151

CSO: 1840/206



## LASER SURGERY ON COMMON BILE DUCT

Moscow SOVETSKAYA MEDITSINA in Russian No 11, Nov 84  
(manuscript received 11 Apr 83) pp 34-38

SKOBELKIN, O. K., professor, BREKHOV, Ye. I., doctor of medical sciences,  
NOVRUZOV, F. Kh., YAKIMENKO, A. P., YELISEYENKO, V. I., SINYAYEV, V. P. and  
GERASIMOVA, O. B., Fourth Main Administration, USSR Ministry of Health, Moscow

[Abstract] CO<sub>2</sub> laser surgery was subjected to clinical evaluation in surgery involving the common bile duct in dogs and human cases. Experimental studies on papillosphincteroplasty showed that the CO<sub>2</sub> surgery involved much simpler and more rapid procedures. In addition, aseptic inflammation without leukocytic infiltration did not lead to deformation of the anastomosis. Consequently, while 88.6% of the original opening of the anastomosis was retained after one month in dogs subjected to laser surgery, the opening had narrowed to 37.5% of the immediate postoperative diameter in dogs subjected to standard surgical procedures. Human trials, involving cases of choledochotomy, choledochoduodenostomy, or papillosphincterectomy also showed the superiority of laser surgery, with more rapid healing and no endoscopic evidence of reduction in the size of the anastomosis even after 4 years. Many of the patients managed by standard surgery continued to experience pain for up to 5 years after surgery and had episodes of cholangitis or pancreatitis. References 17: 15 Russian, 2 Western.  
[1705-12172]

## NEEDLES AND LASERS IN REFLEXOTHERAPY

Tbilisi ZARYA VOSTOKA in Russian 15 Feb 84 p 4

GRIGORASHVILI, G., reflexotherapy physician

[Abstract] The 4th All-Union Conference on Reflexotherapy was recently held in Leningrad, which summarized the extensive progress made in this branch of medicine which is so ancient, and yet has so much new to offer the modern man. Among the more recent advances is the replacement of needles used in acupuncture with finely tuned laser beams, which avoid the risk of infection and are

completely painless. Additional studies have been conducted on the electrophysiological correlates of clinical effectiveness of such treatment. Reflexotherapy has been shown to be remarkably cost effective even in such cases as osteochondrosis in which hospitalization has been curtailed. The Conference concluded with a resolution calling for further fundamental studies and for expanding the scope of clinical entities to be subjected to clinical trials using reflexotherapy.  
[216-12172]

## MARINE MAMMALS

### MARINE LIFE OF LAKE NEAR BLACK SEA ATTRACTS SPECTATORS

Moscow NEDELYA in Russian No 4, 21-27 Jan 85, p 5

[Article by I. Pshenichnaya, Krasnodar Kray: "Immigrants of Solenoye Lake. Nature and People"]

[Text] Hundreds of people gather on the shore of Solenoye [Salt] Lake, which is near the Black Sea. The spectators are attracted by dolphins, fur seals, common seals and sea lions which have learned circus tricks. These marine animals were recently placed in this lake.

The dolphins, Fifa and Lola, leap skillfully upon command. The sea lion, Botsa, stands on his flippers. He has already performed in a major circus program at the Olympiad-80. His trainer, Yuriy Filatov, says that once Botsa got into a tank with fish and consumed 60 kg at one time (he is usually given no more than 15 kg per day), after which he slept straight through in the tank for 2 days; he had to be replaced in the performance with another pinniped "artist." A fur seal named Serezha is jealous of Botsa's trainer and when Filatov works with the sea lion, the fur seal does not even emerge from the water because he is offended.

One of the managers of this unique aquarium, Yaroslav Polyakov, describes for us the future plans for Solenoye Lake. It is presently reserved for keeping and training marine animals. The lake measures more than three hectares in area and is over 7 meters deep. Dolphins will swim there through canals in the sea and encounter steamships with spectators. Scientific experiments can be conducted in the lake pens.

10,657

CSO: 1840/1726

# BRIEF

DOLPHIN STUDIES--Gelendzhik--For three years scientists at the Moscow Institute of Evolutionary Morphology and Animal Ecology, USSR Academy of Sciences, have been working at a dolphinarium located between Novorossiysk and Anapa, in one of the small inlets on the Lesser Utrish cape. In the spring, Gelendzhik dockworkers built a mooring approach to the dolphinarium which made it possible to accommodate motor boats with tourists from Gelendzhik, Anapa, and other Black Sea ports. Institute associates V. Popov and Ya. Polyakov tell the dolphinarium visitors about the life of these amazing sea animals. Besides the dolphins Fifi and Kochi, the dolphinarium contains the fur seals John and Lastochka, and the sea lion Botsman. The experienced trainer V. Kalendin and his assistant A. Chelyshev have the job of working with these animals. An animal training demonstration by the trainers accompanies the scientists' explanations. The intelligence of the dolphins and the sea lion are cause of special interest. Motorboats have brought about 40,000 tourists to Cape Utrish during the summer. [By O. Avdeyev] [Text] [Moscow VODNYY TRANSPORT in Russian 15 Dec 84 p 4] 6289

6289

CSO: 1840/667

## MEDICINE

### BOOK: INFERTILITY TREATMENT

Moscow BESPLODIYE. PRICHINY, SREDSTVA PREODOLENIYA [NOVOYE V ZHIZNI, NAUKE, TEKHNIKE: SERIYA "MEDITSINA"] in Russian No 11, 1984  
(signed to press 22 Oct 84) pp 2, 18, 38, 64

[Annotation, table of contents, and excerpts from book "Infertility, and Methods of Overcoming It", Izdatel'stvo "Znaniye", 1984, 205,140 copies, 64 pages]

[Text] Annotation.

The problem of diagnosing, treating, and preventing infertility is important in both medical and social respects. As a cause of lowered birth rates and family tragedy, infertility often leads to the development of pre-tumorous processes and other obstetric illnesses. The materials of the collection deal with the basic causes of female infertility, its therapy and prevention, and elucidates problems in the organization of medical assistance to women suffering from infertility. The collection is intended for all persons interested in the latest achievements of obstetrics and gynecology.

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[Excerpts] One should particularly note that the inflammatory processes in the reproductive organs which subsequently lead to infertility, most often are developed following an abortion. Illegal abortions, performed outside a hospital are particularly dangerous. According to data from the USSR Academy of Medical Sciences Leningrad Institute of Obstetrics and Gynecology, secondary sterility in 45.5 percent of women resulted from illegal abortion.

At the same time, infertility often occurs after in-hospital abortions which were clinically satisfactory. Such sterility might be caused by an acute disturbance of reproductive system function.

In the previous chapters we have already written that abortion is the most frequent cause of infertility. That is why the preventive treatment of female infertility is inseparably tied to the prevention of abortion and its consequences.

Inflammatory diseases of the female reproductive organs, various disturbances of the menstrual cycle, and extrauterine pregnancy are rather frequently observed at various periods following an abortion (even when performed at medical institutions).

All of this can subsequently lead to infertility. An abortion operation is most dangerous for women with first-time pregnancies. In our country abortions may be performed at appropriate medical institutions. However, to our deep regret, women are still seeking help from persons who perform this operation outside the hospital. Outside-hospital, illegal abortions are particularly dangerous. Such operations can result in profuse hemorrhage, injury to the reproductive and other nearby organs, massive inflammation of the uterus, fallopian tubes, ovaries, and even the peritoneum. This subsequently results in the formation of adhesions which bring about uterine and ovarian displacement, and fallopian tube blockage. The observations of Hungarian investigators indicate that early complications of abortion operations are encountered in 7.68 percent of women, and late complications are found in 11.9 percent of women.

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CSO: 1840/1665

UDC 617-022-07"312"

## SOME FEATURES OF CURRENT STAGE OF STUDY OF SURGICAL INFECTION

Leningrad VESTNIK KHIRURGII IMENI I. I. GREKOVA in Russian No 12, Dec 84  
(manuscript received 10 Apr 84) pp 3-7

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USSR Academy of Medical Sciences A. P. Kolosov) Military Medical Academy  
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[Abstract] A suggested approach to the study of surgical infection includes:  
1) consideration of overall statistical data concerning morbidity, information  
concerning formation of hospital strains of pathogens, creation of specialized  
institutions and coordination of scientific centers for study of problems  
related to infection; 2) study of risk factors in surgical infection and study  
of specific forms of infection and 3) solution of highly specialized problems  
related to infection. The shift from emphasis on prevention and treatment of  
staphylococcal infections to consideration of gram-negative rod microflora  
and now to emphasis on problems related to anaerobic infection was described  
and discussed. Reexamination of current classifications of anaerobic infec-  
tions prevalent in the Soviet Union was recommended in view of the increase of  
knowledge concerning these infections and their role in hospital infections.  
This knowledge must be extended and classifications must be made more precise  
by changes in school programs, so as to emphasize these problems, and by more  
laboratory study of aspects of the problems. References 10: 4 Russian,  
6 Western.  
[1030-2791]

UDC 616.12-089.168.1-06:616.89

## POST-SURGERY PSYCHOSES IN HEART SURGERY

Leningrad VESTNIK KHIRURGII IMENI I. I. GREKOVA in Russian No 12, Dec 84  
(manuscript received 27 Apr 84) pp 7-9

YEFREMENKOV, Ye. A., MIKUTENOK, M. A. and KIKOT', S. O., Surgical Clinic No 1  
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academician of USSR Academy of Medical Sciences), Military Medical Academy  
imeni S. M. Kirov, Leningrad

[Abstract] Post-surgery psychoses, occurring in 56 cases (32 women and 24 men  
ranging in age from 20 up to 54 years) from a total of 2039 heart operations

were analyzed and discussed. Somatic trauma preceded all cases of psychosis. Psychoses followed closed commissurotomy in 20 of 160<sup>4</sup> cases, open commissurotomy in 2 of 62 cases and heart valve prosthesis in 3<sup>4</sup> of 373 cases. Post-surgery complications were attributed to disseminated intravascular coagulation of the blood. The hypercoagulation phase of this syndrome was found in 96 percent of the patients with post-surgery psychoses.

References 9: 3 Russian, 6 Western.

[1030-2791]

UDC 616-001.17-089.844-31:611.77

#### IMMUNOLOGICAL PROGNOSIS OF EARLY LYSIS OF AUTODERMOTRANSPLANTS IN BURN PATIENTS

Leningrad VESTNIK KHIRURGII IMENI I. I. GREKOVA in Russian No 12, Dec 84  
(manuscript received 3 Jun 84) pp 48-50

VIKHRIYEV, B. S., professor, LOMONOSOV, A. S. and VOLCHEK, I. A., Department of Burn Traumas (head--professor B. S. Vikhriyev) Military Medical Academy imeni S. M. Kirov, District Military Hospital, Leningrad

[Abstract] Studies of 28 males ranging in age from 18 up to 52, with flame or boiling water deep burns over 7 percent up to 15 percent (19 patients) or over 16 percent up to 30 percent (9 patients) of the body surface involved determination of indicators of cellular immunity to determine the possibility of predicting lysis of autotransplants. Immunity indicators in the pre-operation period among patients whose transplants "took completely" did not differ from these indicators for healthy blood donors nor were there reliable differences noted in the post-surgery period. Patients with complete or partial lysis of the transplant in the pre-surgery period had an increased (in comparison with group 1 patients and the control group) number of active T-lymphocytes, stable T-lymphocytes and lymphocytes forming rosettes with autoerythrocytes. Attempts to amplify immunodepressive therapy by increased doses of prednisolone, active antibiotic therapy and local radiation therapy did not prevent complete lysis of the transplants in 2 cases but reduced them without complete normalization, in 5 cases. These immunity indicators were normalized later and new autodermotransplants were successful. All 28 patients recovered. References 5 (Russian).

[1030-2791]



## BLOOD REPLACEMENT WITH BLOOD OF IMMUNE DONORS IN TREATMENT OF ACUTE BURN TOXEMIA IN CHILDREN

Leningrad VESTNIK KHIRURGII IMENI I. I. GREKOVA in Russian No 12, Dec 84  
(manuscript received 28 Feb 84) pp 80-84

MEL'NIK, D. D., PERVEYEV, V. I., doctor of medical sciences and MOSKVIN, V. I., professor, Department of Children's Surgery (head--professor V. I. Moskvina) and Department of Traumatology and Military Field Surgery (head, V. I. Perveyev, doctor of medical sciences) Tomsk Medical Institute

[Abstract] Effectiveness of use of direct blood transfusions (32) from burn convalescents to 27 burn victims ranging in age from 2 months up to 14 years, with burns on 25 percent up to 80 percent of the body surface was compared to effectiveness of 1048 direct blood transfusions to 150 children ranging in age from 2 months up to 14 years with burns on 4 percent up to 94 percent of the body surface. Direct replacement from immune donors in amounts from 200 up to 800 ml reduced the toxicity of the blood, improved the central hemodynamics and increased the level of specific and non-specific immunity in comparison with transfusions from ordinary donors. Use of blood of immune patients was indicated after generally accepted methods of treatment are ineffective. Direct replacement from immune donors alleviated the course of the burn process, reduced the length of the hospital stay and greatly reduced mortality among severely burned children in the period of acute toxemia. Donors were readily available since only 1-2 donors per patient are required. References 6: 5 Russian, 1 Western.  
[1030-2791]

UDC 616.12-005.4-036.865

## PREDICTION OF WORK CAPACITY OF PATIENTS WITH CORONARY HEART DISEASE

Moscow SOVETSKAYA MEDITSINA in Russian No 11, Nov 84  
(manuscript received 31 Oct 83) pp 61-63

TANYUKHINA, E. I., NIKOLAYEVA, N. V. and KRIVENKOV, S. G., Leningrad Scientific Research Institute of Work Capacity Expertise and Work Organization for the Handicapped

[Abstract] An analysis was conducted on the factors which have predictive value in assessing work capacity of patients with coronary heart diseases. Evaluation of 165 cases in relation to clinical condition and working environment underlined the importance of the latter in successful rehabilitation programs. For optimum recovery and work performance the key factors were adjustment in work routines, including additional rest breaks, moderate physical requirements, opportunity for setting individual work pace, and the psychological environment. A complex approach, encompassing careful evaluation of the work factors, appears to be the best path to rehabilitation and prevention of coronary heart disease. References 4: 2 Russian, 2 Western.  
[1705-12172]

# PREVENTION OF POSTABORTION COMPLICATIONS

Moscow SOVETSKAYA MEDITSINA in Russian No 11, Nov 84  
(manuscript received 22 May 84) pp 108-110

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[Abstract] Vibromassage was subjected to a clinical trial in the case of 168 women, 20-40 years old, who underwent elective abortions, to test the effectiveness of this modality in alleviating or preventing complications. The patients were subjected to vibromassage (110 Hz, 0.5 mm amplitude, 3 min session) immediately following the procedure and 1-2 days thereafter. The treatment was found to stimulate the contractile activity of the uterus and diminished blood loss. Follow-up of the patients 12-24 months later showed that menstrual dysfunction and infertility were noted in 19.3 and 8.2% of the subjects, while the respective figures for a control group of women who were not treated with vibromassage were 14.1 and 16.2%. The rates of pregnancy in these two groups within 6 months of the procedure were, respectively, 9.1 and 7%.  
References 11: 10 Russian, 1 Western.  
[1705-12172]

# PHEROMONES AND SOME PRACTICAL USES OF THEM

Moscow NEDELYA in Russian No 3, 14-20 Jan 85, p 10

PRAL'NIKOV, ANDREY

[Abstract] This article entitled "Oldest Language on Earth" presents aspects of the use of pheromones in the animal world and brief examples concerning their use by some animals. The USSR Academy of Sciences Institute of Evolutionary Morphology and Ecology of Animals is one of two dozen or more Soviet scientific organizations involved in a joint study "Pheromones", aimed at creation of a complete picture of animal communications with the aid of chemical signals and development of a theory of chemical communication. Examples of use of pheromones by animals included brief accounts of their use by mulberry silkworms, mice and salmon. Use of pheromones to control plant and animal pests is mentioned briefly. A table of facts about pheromones was presented.  
[187-2791]

UDC 579.846.23:620.193.8:669.14+579.846.23.086.3

ADHESION OF THIONIC BACTERIA TO SURFACE OF STEEL

Kiev DOKLADY AKADEMII NAUK UKRAINSKOY USSR. SERIYA B: GEOLOGICHESKIYE, KHIMICHESKIYE I BIOLOGICHESKIYE NAUKI in Russian No 11, Nov 84

[Article by Ye. I. Andreyuk, corresponding member of the UkSSR Academy of Sciences, V. M. Romanenko, and I. A. Kozlova, Ukrainian Academy of Sciences Institute of Microbiology and Virology, Kiev: "Adhesion of Thionic Bacteria to the Surface of Steel"]

[Text] One aspect of the geochemical activity of bacteria of the sulfur cycle is their corrosion activity, manifested in different mechanisms of the corrosion process [1]. Most researchers [2] believe that the participation of thionic bacteria in the corrosion of metal is connected with their creation of aggressive acid media. We established [3] the effect of thionic acidophilic and acidophobic bacteria on the corrosion of steel and their role in accelerating electrode processes, which is possible only with close contact of the bacterial cells and the metal being corroded. The point nature of the damage to the steel samples studied, occurring under the influence of thionic bacteria, allows us to suggest the possibility of their attachment to the metal with subsequent action as a factor initiating corrosion. In connection with this, our goal was to establish the possibility of adhesion of *Thiobacillus thiooxidans* to the surface of steel by the method of electron microscopy.

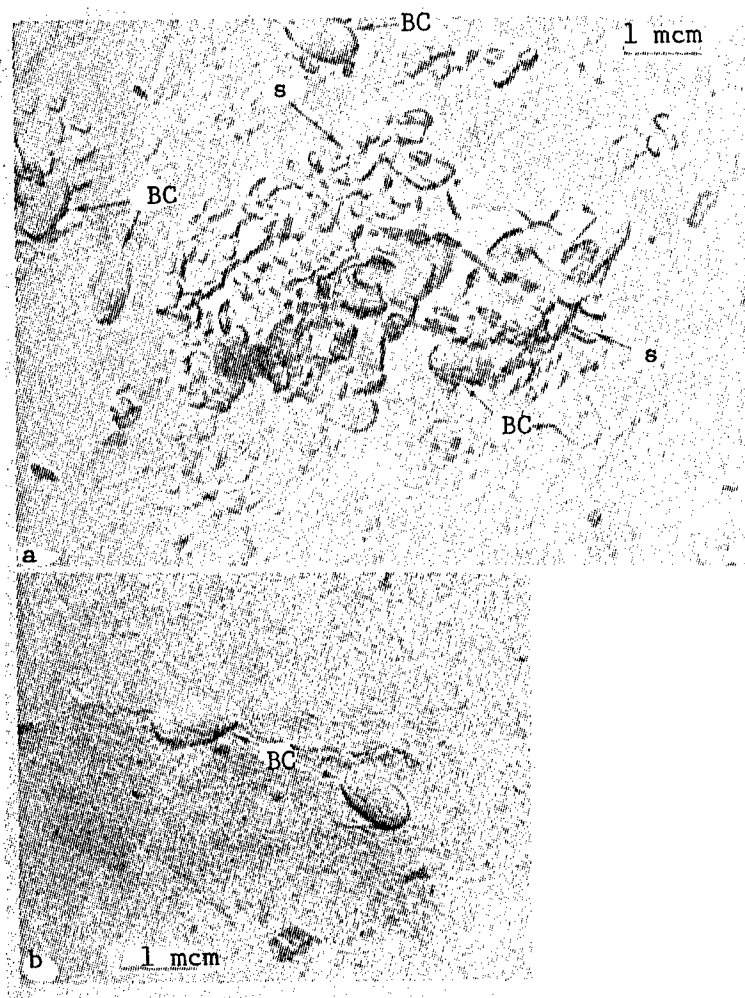
We studied a culture of *T. thiooxidans*, item 719, separated from an aggressive medium originating in geological deposits of the Paleogene [3].

We studied the attachment of *T. thiooxidans* cells to metal by electron microscopy of carbon replicas from the surface of Kh10N18T steel plates, exposed for 27 days to a Vaksman and Ioffe medium with elementary sulfur ground to a powder, and without sulfur but containing sodium thiosulfate, at an initial bacteria concentration of  $10^9$  cells per milliliter. During this we used the method of fixation by drying from the frozen state as the best means of preserving the surface structures and conformations of individual cells [4].

After exposure to the medium with the *T. thiooxidans* culture, the steel plates were washed with sterilized tap water in a magnetic mixer and immediately transferred into liquid freon-22 which had been cooled in a bath with liquid nitrogen, then transferred into liquid nitrogen, and from it, under vacuum

conditions, to the stage (cooled by liquid nitrogen) of a JEE-4v vacuum device. Preparations from the frozen state were dried for 8 hours at  $1.33 \cdot 10^{-2}$ – $1.33 \cdot 10^{-3}$  pascals. After this, the preparations were covered with a thin layer of carbon by rotation tinging at various angles and tinged with platinum and palladium at an angle of 30 degrees. Replicas of the surface of the metal with material of the medium adhering to it and cells of the bacteria were made using celloidine (in acetone) or gelatin (in water), the replicas were transferred onto copper screens and studied using a JEM-7 electron microscope.

Electron microscope study of carbon replicas from the surface of steel in a culture of *T. thiooxidans* in a liquid medium showed that the thionic bacteria were attached to the surface of the steel both in the presence of sulfur and in its absence (photographs a, b). Despite the active washing, individual cells remain attached to the metal, as well as small aggregates of bacteria formed as a result of division and the formation of microcolonies directly on the surface of the metal.



Electron microphotographs of replicas from the surface of Kh10N18T steel exposed for 27 days to a culture of *Thiobacillus thiooxidans* in a liquid medium with elementary sulfur (a) or with sodium thiosulfate (b). BC -- bacterial cell; S -- microparticles of elementary sulfur; -- scale -- 1 micrometer.

Microparticles of elementary sulfur are also discovered on the surface of the metal, but only in places where there are attached bacteria, and in direct contact with them. Adhesion of sulfur particles is not observed on the metallic surface which is free from attached bacteria cells. It should be noted that sulfur added to the medium in the form of finely divided powder initially remains on the surface in the form of a film, but is then adsorbed to the metal plates submerged vertically in a liquid nutrient medium. In the control medium without bacteria, adsorption of the sulfur to the surface of the steel was not observed.

The ability of thionic bacteria to attach to elementary sulfur and sulfide minerals has been previously established [5, 6]. It was shown that the process of adhesion which occurs during the interaction of *T. thiooxidans* cells and elementary sulfur must be energy-dependent [6]. Our data agree with the conclusions of [5, 6]. Under the conditions of a liquid medium, in attaching to the surface of steel and forming microcolonies on it, the thionic bacteria promote the adsorption of particles of elementary sulfur; as a result, isolated microaggregates of bacterial cells form on the surface of the steel (from a few individuals to dozens of cells) and also accumulations of particles of elementary sulfur adsorbed to them. Naturally, in the process of their vital activity, the bacteria in each such microaggregate actively oxidize sulfur. As a consequence of this, microgradients of increased concentration of sulfuric acid are produced directly on the surface of the metal--that is, microzones of increased aggressiveness are created. Of course, it is these microzones which initiate the corrosion of steel in the form of many points of corrosion damage--pitting.

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UDC 582.282.123.2+579.873.11.017.7:57.045

GROWTH AND METABOLISM OF MICROSCOPIC FUNGI UNDER EXTREMELY LOW HUMIDITY

Moscow MIKROBIOLOGIYA in Russian Vol 53, No 6, Nov-Dec 84  
(manuscript received 25 Jan 83) pp 918-922

IMSHENETSKIY, A. A., MURZAKOV, B. G., KUZURINA, L. A. and YAKSHINA, V. M.,  
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[Abstract] The growth and metabolism of several microscopic fungi were evaluated under conditions of extremely low humidity. The fungi were cultured on Czapek's agar medium at 24°C. Excellent mycelial development at  $a_w = 0.55$  were shown only by *Penicillium adametzii*, isolated from the soil on Taymyr Peninsula. In addition, weak growth was also shown by some cryptococci. With decreasing environmental humidity the catabolic activity of *P. adametzii* showed profound abatement, with the biochemical activity directed essentially at preparation of the cell for anabiosis and retention of water reserves. At  $a_w = 0.65$   $CO_2$  production continued for 45 days, although on day 45 it was twice as low as on day 7 under identical conditions of dehydration. Figures 2; references 17: 9 Russian, 8 Western.  
[1718-12172]

UDC 579.841.1-22:577.115

CHANGES IN LIPIDS AND THEIR FATTY ACID COMPOSITION DURING BATCH CULTIVATION OF LUMINESCENT BACTERIA

Moscow MIKROBIOLOGIYA in Russian Vol 53, No 6, Nov-Dec 84  
(manuscript received 19 May 83) pp 932-937

KALACHEVA, G. S. and VYSOTSKIY, Ye. S., Institute of Biophysics, Siberian Department, USSR Academy of Sciences, Krasnoyarsk

[Abstract] Studies were conducted on the correlation between the growth phase in batch culture of the luminescent bacterium *Photobacterium leiognathi* and its lipid and fatty acid composition. During induction of the luminescent system, significant quantities of lysophospholipids were formed on a defined mineral medium, containing significantly less palmitoleic acid than found in the corresponding phospholipids (phosphatidylethanolamine and cardiolipin)

from which the lyso forms were derived. These findings indicated that with induction of luminescence there was preferred removal of palmitoleic acid from the phospholipids. However, since the concentration of this fatty acid in the free fatty acid pool was relatively low (22.5-34.0%) in this phase of the growth curve, it appears to have been utilized in the metabolic events leading to luminescence. In the stationary phase of growth, characterized by falling luminescence, the palmitoleic acid fraction increased to 67% of the total. Figures 1; reference 16: 7 Russian, 9 Western.  
[1718-12172]

UDC 579.6:550.72-387

#### MICROBIAL AND PHYSICOCHEMICAL FACTORS IN QUARTZ DEGRADATION

Moscow MIKROBIOLOGIYA in Russian Vol 53, No 6, Nov-Dec 84  
(manuscript received 28 Nov 83) pp 976-981

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[Abstract] Chemical and electron microscopic studies were conducted on quartz degradation to assess the contribution of the bacterial component to this process. Both autotrophic and heterotrophic bacteria were found capable of breaking siloxane bonds (Si-O-Si). *Thiobacillus thioparus* and *Bacillus mucilaginosus* were found to expand considerable the pH range under which degradation occurred (pH 5-9) due to the action of their metabolites, than was the case under analogous conditions in the absence of the bacteria. In addition, as the medium underwent alkalinization, biodegradation intensified, the siloxane bond being highly refractory to disruption under acid conditions. Salts potentiated the rate of siloxane bond rupture and, hence, quartz degradation. It is evident, then, that bacteria exert a direct effect on the breakage of siloxane bonds via their metabolic products (polysaccharides, lipids, phospholipids, organic acids, etc.). Figures 5; references 12: 10 Russian, 2 Western.  
[1718-12172]

UDC 579.842.11-22

#### SPECTROFLUOROMETRIC ANALYSIS OF ESCHERICHIA COLI STORAGE IN PHYSIOLOGICAL SALINE

Moscow MIKROBIOLOGIYA in Russian Vol 53, No 6, Nov-Dec 84  
(manuscript received 11 May 83) pp 1016-1020

ROSHCHINA, Ye. K., DOBROLEZH, O. V. and PETROV, L. N., All-Union Scientific  
Research Institute of Highly Purified Preparations, Leningrad

[Abstract] A time-course spectrofluorometric analysis was conducted on *E. coli* M-17 during storage in physiological saline at  $20 \pm 2^\circ\text{C}$ . Analysis of the

saline showed that excitation with 280 nm light evoked fluorescence at  $333 \pm 1$  nm, which was attributed to protein and peptide components released by the cells. Excitation with 350 nm light led to the appearance of fluorescence at 430 nm, with a shoulder at 500-520 nm in the first ten or so days of storage. Eventually the second maximum shifted to 425 nm. Evaluation of viability data and fluorescence peaks revealed a statistically-significant negative correlation coefficient between fluorescence at 425-430 nm and viability. Fluorescence in the 425-430 nm range was attributable to menaquinones (vitamins  $K_2$ ), with the shift to the lower wavelength representing peroxidation of the fatty acid component. Peroxidation of the menaquinones, since it affects the cell membrane, may be a factor in the loss of viability of *E. coli* cells. Consequently, measurement of fluorescence at 425-430 nm may constitute a convenient method for assessing the viability of *E. coli* suspensions. Figures 4; references 10: 6 Russian, 4 Western.  
[1718-12172]

UDC 616.98:579.842.1/.2]-022.369-036.2-078:[579.842.1/.2:579.252.55

PLASMIDS AND MULTIPLE DRUG RESISTANCE OF ENTEROBACTERIACEAE IN HOSPITAL  
SETTING: MEDICAL AND THEORETICAL ASPECTS

Moscow ANTIBIOTIKI in Russian No 12, Dec 84 (manuscript received 22 May 84)  
pp 924-931

BELOKRYSENKO, S. S. and DUGASHEVA, L. G., Interfaculty Laboratory Complex,  
Second Moscow Medical Institute imeni N. I. Pirogov

[Abstract] Multiple drug resistance in *Escherichia coli* and *Klebsiella pneumoniae* were studied over the period 1979-1983 in a hospital for premature infants, to determine changing patterns of resistance and plasmid involvement. Multiple drug resistance was related to individual plasmids in the pPI series. In the various serologic groups of *E. coli*, individual plasmids were identified with MWs ranging from 4 to 80 Mdaltons. In the *K. pneumoniae*, responsibility for multiple resistance was borne by large plasmid cointegrates bearing 6-8 resistance markers, characterized by MWs in the 100-200 Mdaltan range. There was extensive exchange of the plasmids between bacteria in the hospital setting via conjugative mechanisms, with the multiple resistant strains readily colonizing the nasopharynx of the infants. Figures 4; references 12: 1 Russian, 11 Western.  
[1707-12172]



UDC 579.841.11+579.252.5

GENETIC CONTROL OF BIPHENYL AND NAPHTHALENE CATABOLISM BY PSEUDOMONAS  
FLUORESCENS Pfl and PflE2

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 280, No 2, Jan 85  
(manuscript received 25 May 84) pp 505-507

STAROVOYTOV, I. I. and YESINA, V. A., Institute of Biochemistry and Physiology  
of Microorganisms, USSR Academy of Sciences, Pushchino, Moscow Oblast

[Abstract] Soil samples were studied for the presence of bacteria capable of biodegradation of biphenyl and naphthalene, resulting eventually in the isolation of two strains of Pseudomonas fluorescens, designated as Pfl and PflE2. Both strains grew well on media containing biphenyl or naphthalene as the sole source of carbon, with the growth on the latter being greater than on the former source. This difference was ascribed to the greater water solubility of naphthalene. Genetic analysis showed that naphthalene catabolism was under chromosomal control, while metabolism of biphenyl was dependent on a 130 megadalton plasmid. The plasmids in Pfl and PflE2 were designated pBS300 and pBS301, respectively. Figures 2; references [194-12172]

UDC 613.22:615.371+615.874.015.2:615.371].03:616-053.2

PROTECTIVE DIETARY FACTORS IN PEDIATRIC NUTRITION

Moscow VOPROSY PITANIYA in Russian No 6, Nov-Dec 84  
(manuscript received 10 Nov 83) pp 7-11

BLOKHINA, I. N., Scientific Research Institute of Epidemiology and  
Microbiology, Gorkiy

[Abstract] Although many dietary factors in childhood nutrition have received adequate research interest, the effects of diet on enteric microbial flora in children has been neglected to a large extent. It has been well documented that maternal milk markedly alters the enteric flora in breastfed infants, but relatively little has been done to correlate such effects with the health status of the infants. However, certain investigators (P. V. Fedotov) have demonstrated the beneficial effects of including lactobacilli in pediatric diets, and in Gorkiy it has been shown that incorporating lactobacterin into such diets reduced the hospitalization time for pediatric cases of dysentery by a third. Many investigators have advanced the idea of creating a collection of lactic acid bacteria suitable for supplementing the diets of children. In addition to bacterial factors, it has also been suggested that egg yolk and egg protein emulsions be used as nutritional supplements for children, as well as lysozyme preparations, immunoglobulins derived from colostrum, and other factors that may enhance both the nutritional and immune status of children. References 38: 35 Russian, 3 Western. [1734-12172]

## MILITARY MEDICINE

### HEALTH TREATMENT FOR VETERANS DISCUSSED

Moscow IZVESTIYA in Russian 16 Jan 85 p 2

[Interview with A. Safonov, deputy minister of the USSR Ministry of Health, by V. Turshatov; date and place not specified: "Prescription for a Veteran"]

[Text] Among the measures noted by the party and the government for the 40th anniversary of the victory of the soviet people in World War II, concern for the health of the veterans occupies a particular place. The USSR Ministry of Health adopted a resolution on improving medical service for war veterans and families of those who died in service. A special council was organized to monitor its fulfillment. Our collocutor is A. Safonov, chairman of this council and deputy minister of the USSR Ministry of Health.

First of all, probably, one must recount the directions which our work is taking. Let us begin with the expansion of the network of inpatient medical aid to veterans. New hospitals are being opened for us, as well as new wings being constructed in already existing ones. Before the end of 1985 an additional 50 treatment sections with 3,060 beds on the whole will be put into operation. The medical personnel are being staffed completely, and we are trying to attract more experienced, attentive and responsive workers. Where there are no such hospitals, oblast and municipal inpatient establishments are opening special divisions or are singling out separate wards. All veterans, without exception, now have the right to top-priority hospitalization at any clinic, hospital or medical scientific research institute.

The same thing may be said of outpatient medical treatment. Upon presenting the appropriate documents, patients immediately receive coupons for acceptance by a physician, and have first priority for specialist care.

[Question] Aleksey Georgiyevich, as experience shows, war veterans and disabled veterans do not always take advantage of the benefits offered them. Many simply feel too shy to show their certifications to the line ["queue"].

[Answer] Wherever possible, we try to take this into consideration as well. The registration offices at the polyclinics have separate windows for veterans. In conjunction with the military commanders and social security organs, the public health workers have already compiled lists of war veterans and of the families of those killed in military service. Every year they will make, according to schedule, a dispensary review, and on specific days they will meet with experienced specialists. In all outpatient clinics, polyclinics and dispensaries, without exception, by order of the chief physician, the one responsible for serving veterans will be designated.

The service for providing medications has been reorganized. Disabled veterans obtain them at pharmacies free of charge. Those who are merely veterans are granted a 50-percent discount. Public health institutions are provided with prescription blanks, in accordance with which the medicines will be issued with special privileges.

[Question] Often, in a pharmacy, when one asks about a certain preparation, the answer is "no". What to do then?

[Answer] Veterans, in obtaining medications also, enjoy the right to top-priority and reliable supply. This means not only not having to stand in line, but also counting on their own "veterans" fund. In large cities, specialized pharmacies have already appeared. They have everything necessary, including items in so-called "short supply". This sort of supply is usual. All the same, if there is not enough of something, the pharmacists themselves, having communicated with the warehouse or another pharmacy, should fill a veterans order within two to three days.

Unfortunately, there are still some cases when they are not promptly provided with medical aid and medicines. Each violation, however, is taken into consideration, and measures are taken.

In addition to these measures, a ministry resolution specifies ensuring maximal satisfaction in sanatorium-resort treatment.

CSO: 1840/206  
12151

## NONIONIZING ELECTROMAGNETIC RADIATION EFFECTS

UDC 616-008.922.1-008.64-092.9

### EXPERIMENTAL SIMULATION OF HYPOXIA IN HYGIENIC STUDIES

Moscow GIGIYENA I SANITARIYA in Russian No 12, Dec 84  
(manuscript received 6 Feb 84) pp 59-61

RUDNEV, M. I., Kiev Scientific Research Institute of General and Communal Hygiene imeni A. N. Marzeyev

[Abstract] Hygienic assessment of the physiological effects of electromagnetic waves was conducted on control outbred rats and animals with experimentally-induced renal hypertension, to simulate possible human consequences in the absence and presence of disease. The animals were exposed to 12.6 cm, 2375 MHz waves of variable intensities ( $15-500 \mu\text{W}/\text{cm}^2$ ) for exposure times ranging from 3 h (for  $500 \mu\text{W}/\text{cm}^2$ ) to 3h/day (15, 30, 50) for 10 days. The general effects consisted of depression of the respiratory functions represented by diminished pulmonary ventilation, decreased oxygen uptake, reduced thermodynamic coefficient, and reduction in intra-tissue temperature, as well as an increase in the oxygen pressure of muscle tissue and depression of mitochondrial respiration and oxidative phosphorylation in the liver and brain. These sequelae of electromagnetic exposure were potentiated in the rats with renal hypertension, indicating that an underlying pathology can significantly exacerbate environmental influences. References 16: 13 Russian, 3 Western.  
[1735-12172]

UDC 615:849.1.015.4.07

### EXPERIMENTAL STUDY OF EFFECTS OF ACUTE UNEVEN MICROWAVE IRRADIATION

Moscow MEDITSINSKAYA RADIOLOGIYA in Russian No 12, Dec 84  
(manuscript received 4 Mar 84) pp 46-49

ZUYEV, V. G. and USHAKOV, I. B.

[Abstract] Assessment of lethal effects from variants of uneven microwave irradiation with consideration of absorbed power of electromagnetic radiation involved study of 84 mongrel female rats (average weight  $-250 \pm 5\text{g}$ ) subjected to microwave irradiation at a frequency of 2.4 GHz with energy density flux of  $300 \text{ mW}/\text{cm}^2$ . A segment of rat body (cranial, thoracic, abdominal or caudal)

was irradiated while the other segments were shielded [thus, "uneven" radiation] and the injurious effect of the electromagnetic radiation was assessed by the number of deaths following irradiation of a given segment. Most deaths occurred after irradiation of the cranial region while irradiation of other segments with this segment protected showed the capacity of the organism to survive after an equivalent radiation dose. Findings of the experiment correlated closely with the curve of equal effect of a 50 percent lethal criterion for rats after total irradiation by microwave electromagnetic radiation. The findings suggested that lesion of the central nervous system plays a leading role in injury after total irradiation in the specific power range of 15-40 mW/g. Figures 2; references 15: 8 Russian, 7 Western.  
[1028-2791]

## PHARMACOLOGY AND TOXICOLOGY

UDC 615.9.678.5

### COMPARATIVE TOXICITY OF 4,4'-DIAMINODIPHENYL AND 3,3',4,4'-TETRAAMINODIPHENYL ETHERS AND SYNTHETIC INTERMEDIATES

Novosibirsk IZVESTIYA SIBIRSKOGO OTDELENIYA AKADEMII NAUK SSSR: SERIYA BIOLOGICHESKIKH NAUK in Russian No 18(392), Issue 3, Dec 84  
(manuscript received 27 Jun 83) pp 124-126

LAPIK, A. S. and DOLGIKH, M. P., Novosibirsk Institute of Organic Chemistry, Siberian Department, USSR Academy of Sciences

[Abstract] Several species of experimental animals [albino mice, rats, rabbits, cats] were used in LD<sub>50</sub> determinations of the toxicity of 4,4'-diaminodiphenyl (I) and 3,3', 4,4'-tetraaminodiphenyl(II) ethers on intragastric or intraperitoneal administration. Both compounds were moderately toxic with LD<sub>50</sub> values in the range of hundreds of mg/kg, with the toxicity generally greater on intraperitoneal administration. The observed effects were ascribed to nonspecific neuronal involvement, characterized by hypokinesia, hypothermia, and depression of the respiratory rate which resulted in death. There was no indication of skin or mucous membrane irritation, and no apparent cardiovascular or hematologic sequelae. Intermediate products obtained in the synthesis of I and II--3,3', 4,4'-tetraacetyldiphenyl and 3,3'-dinitro-4,4'-diaminodiphenyl ethers--also possessed low toxicity. References 5 (Russian). [1034-12172]

### NEW PREPARATIONS FROM OLD VITAMINS

Moscow NEDELYA in Russian No 4, 21-27 Jan 85, p 5

YERMOLENKO, Anna, Moscow

[Abstract] Vladimir Ivanovich Gunar, Doctor of Chemical Sciences, director of the All-Union Scientific Research Vitamin Institute, has described work presently underway at the institute. Clinical and experimental studies performed there have shown the possibility of using lipoic acid to treat severe poisonings such as poisoning by the "death cup" (*Amanta phalloides*, Fr.). A collagen-covered film with Hippophae oil, which is applied to burned skin and remains affixed until normal skin is restored has been developed and will be available in 1985. A prolonged-action nitroglycerin which provides relief

from heart pain for 8-10 hours, has been developed. Industrial production of granulated forms of vitamins E, B<sub>2</sub> and D<sub>3</sub>, to be used in balanced fodders, is now being mastered. A technology of continuous production of vitamin E for use in agriculture is being developed. The institute has emphasized studies of ways of making vitamin production cheaper, finding the most effective combinations of them and extending the medical potentials of existing vitamins, in their work over the last 20 years.

[1725-2791]

UDC 612.13+612.5

COMPARATIVE STUDY OF CUTANEOUS BLOOD FLOW CONTROL FACTORS IN THERMONEUTRAL TEMPERATURE RANGE

Leningrad FIZIOLOGICHESKIY ZHURNAL SSSR IMENI I. M. SECHENOV in Russian  
Vol 70, No 11, Nov 84 (manuscript received 27 Jun 83) pp 1518-1526

BEDROV, Ya. A., GEKHMEN, B. I. and VERSHININA, Ye. A., Physiology Laboratory of Thermoregulation and Bioenergetics, and Applied Mathematics Group, Institute of Physiology imeni I. P. Pavlov, USSR Academy of Sciences

[Abstract] Several model systems involved in regulation of cutaneous blood flow were analyzed in rabbits within the temperature range 22-28°C, in order to correlate fluctuation in body temperature with the regulatory mechanisms. Temperature measurements were made with thermocouples from the hypothalamus, rectum, skin, and ear auricles. Despite fluctuations in temperature and changes in the fluctuation pattern, the rates of temperature increase or decrease remained constant in the hypothalamus and the ear auricles in the thermoneutral range. A relay mechanism appears to be operative in the control of cutaneous blood flow in maintaining the hypothalamic temperature relatively stable. The temperature stabilization system exists in a static equilibrium with the hypothalamic temperature with an environmental temperature of 20°C and minimum auricular blood flow. Similar preservation of an equilibrium at 30°C requires a maximum flow rate in the auricles. The relay mechanism controlling auricular blood flow is responsible for the opposite phases of temperature oscillations in the hypothalamus and the ear auricles. Figures 5; references 19: 9 Russian, 10 Western.  
[1703-12172]

UDC 613.71/.73-07:612.52]-02:[725.852/.856.028.8

HYGIENIC THERMAL STANDARDS IN INDOOR SPORTS FACILITIES

Moscow GIGIYENA I SANITARIYA in Russian No 12, Dec 84  
(manuscript received 23 Jan 84) pp 12-15

LAPTEV, A. P., POLIYEVSKIY, S. A., PERESHIVKO, N. S., MALYSHEVA, I. N. and GALAL' El'-Din, A., Institute of Physical Culture, Moscow

[Abstract] Studies were conducted on radiant heat exchange between individuals engaged in track and field events and horse-riding and surrounding walls and partitions in indoor sports facilities, in order to determine optimum



temperature levels for such activities. The studies were conducted with twelve 18-19-year-old subjects engaged in activities requiring the expenditure of 100-150 W/m<sup>2</sup> of energy with 70% exercise saturation. Optimum parameters were defined in terms of comfort experienced by 80-85% of the subjects, which corresponded to an air temperature of 19.8-21°C and a relative humidity of 39-57%, with the temperature of the partitions falling 3-4°C below the ambient temperature. Under the given conditions, the radiation balance corresponded to 0.05587-0.06700 cal/cm<sup>2</sup>/min. Lowering the partition temperature by 5-7°C vis-a-vis ambient temperature resulted in excess loss of body heat (0.07053-0.07917 cal/cm<sup>2</sup>/min), and led to complaints of chilliness. The mean skin temperature of the frontal lobe area showed direct correlation with the rate of body heat loss to the surrounding partition as long as the temperature difference between the partitions and the air temperature did not exceed 5°C. Low levels of body heat loss (0.04-0.01 cal/m<sup>2</sup>/min) prevail when the temperature of the partitions exceeds that of air. References 10 (Russian). [1735-12172]

UDC 613.24-07:612.76

#### EFFECTS OF PROLONGED LOW-CALORIE DIET ON HUMAN ORTHOSTATIC STABILITY

Moscow VOPROSY PITANIYA in Russian No 6, Nov-Dec 84  
(manuscript received 26 Dec 83) pp 31-33

TSYGANOV, E. P., KOLCHIN, Ye. V. and DUPIK, V. S., Moscow

[Abstract] The effects of prolonged (3-week) low-calorie diet on human orthostatic behavior were studied on 10 male volunteers with a mean age of 31 years and a mean body weight of 73.2 kg. The diet providing 1200 Cal/day, consisted of 49.4 g protein, 28.0 g fats and 181 g carbohydrates; daily energy expenditure was set at ca. 2900 Cal/day. During the low-calorie period all objective and subjective physical and mental signs remained normal; during that time mean loss in body weight amounted to 7.1%. Active orthostatic testing showed that the increase in the heart rate on changing body position was equivalent to that observed in the control period, but 6 days into the recovery period after the low-calorie period was markedly elevated under the test conditions. The systolic, pulse and mean arterial BP during the experimental period and the recovery period in the vertical position were lower than control values. These observations indicated that a low-calorie diet leads to orthostatic instability which persists into the recovery period, apparently as a result of diminished tone of the peripheral vasculature. References 9: 6 Russian, 3 Western. [1734-12172]

## POSSIBLE EXISTENCE OF TETRODOTOXIN-SENSITIVE, POTENTIAL-DEPENDENT CHLORINE CONDUCTANCE IN MEMBRANES OF PERFUSED CARDIOMYOCYTES

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 279, No 4, Dec 84  
(manuscript received 15 May 84) pp 1012-1015

PIDOPLICHKO, V. I. and VERKHATSKIY, A. N., Institute of Physiology imeni  
A. A. Bogomolets, Ukrainian SSR Academy of Sciences, Kiev

[Abstract] Low tetrodotoxin (TT) concentrations ( $10^{-11}$ - $10^{-10}$  M) produced an increase in the amplitude and a slight delay in the kinetics of the incoming ion current in enzymatically isolated cardiomyocytes (left ventricle of 1-month-old rats). The increase in current did not depend on the TT source (Servo or Sankyo), and the increase in incoming current amplitude, which varied from 20 to 70% for  $10^{-11}$  M TT, did not depend on the species of intracellular anion ( $F^-$  or  $PO_4^{3-}$ ). The concentration dependence of the TT effect on the difference current was described by a Langmuir isotherm; this indicated the absence of cooperativity in toxin action. The effects of low TT doses were potential-dependent and were observed at test potentials  $V_T$  of -60 to +40 mV. The most likely of several mechanisms for the TT effect are activation of additional channels of incoming current or blocking of anionic (chlorine) channels. Additional experiments showed that the TT effect was not related to the potentiation of  $Na^+$  channels but to the existence of TT-sensitive chlorine conductance in cardiomyocyte membranes. A similar effect was also found in trigeminal ganglionic neurons from rats; this suggests that the basic mechanism for this effect is universal and prevalent. Figures 4; references 6 (Western).  
[1685-9307]

## PUTATIVE MECHANISMS OF ACTION OF ENKEPHALINS ON LEARNING AND MEMORY

Moscow BIOLOGICHESKIYE NAUKI in Russian No 12, Dec 84  
(manuscript received 12 Aug 83) pp 45-49

KRUGLIKOV, R. I., CHIPPENS, G. I., GETSOVA, V. M., YUSHIN, V. A., MATS, V. N., MAYZELIS, M. Ya., ZHULIN, V. V. and BOBROVA, I. V., Institute of Higher Nervous Activity and Neurophysiology, USSR Academy of Sciences

[Abstract] Albino male rats were employed in studies on the mechanism of action of enkephalins on learning and memory in intact rats, and in animals with altered serotonergic mechanisms, achieved by electrolytic destruction of raphe nuclei or 5-hydroxytryptamine (100 mg/kg) administration. Administration of enkephalin (10  $\mu$ g) to intact animals enhanced formation of a conditioned bilateral avoidance reflex (CBAR), but not its retention. Concomitantly, such treatment had a negative effect on the retention of a conditioned passive

avoidance reflex (CPAR). Administration of 5-hydroxytryptamine, which led to elevated serotonin levels, abrogated the effects of enkephalin in enhancing CBAR formation. However, administration of enkephalin to animals with depressed or elevated levels of serotonin favored CPAR retention. Biochemical studies showed that enkephalin depressed the incorporation of radio-labeled amino acids (tyrosine, lysine) into the water-soluble and insoluble fractions of various brain formations. On the whole, these observations point to the involvement of the serotonergic system in the mechanism of action of enkephalins on learning and memory, and to the importance of protein synthesis. Figures 1; references 10: 4 Russian, 6 Western.  
[248-12172]

## PUBLIC HEALTH

### THEFT AND FALSIFICATION OF VARIOUS MEDICAL FORMS IN LENINGRAD

Leningrad VECHERNIY LENINGRAD in Russian 29 Aug 84 p 2

[Article by G. Kolesnikova: "Forged Prescription, or Nearly a Detective Story That Has Not Yet Been Finished"]

[Text] I don't know how many times I have examined the contents of the thick file, and again I wonder whether I should play detective. I have quite enough suitable material for such a job and, it appeared, all the necessary attributes for the genre are here--theft, intrigue and forged documents. But the end is still not clear to me. This is why I shall limit myself to an ordinary report.

Thus, at a certain institution having no bearing on medicine or, more precisely, at a secondary specialized educational establishment, a gray office file was discovered, which appeared at first glance to be quite ordinary. It contained documents that should have belonged only to medical workers. And almost all of the documents had not been filled out, although they did have the distinct seals and stamps of polyclinics, walk-in centers and medical offices. For example, there is even a disability certificate which, as we know, is a strictly accountable type of form.

Someone gathered forms that would fit all situations. For example, if one needs a form that releases a student from classes, here you are: all you have to do is enter the surname and date. Is it a prescription for a scarce or free medicine for a disabled veteran that is needed? That is no problem either. And such a trivial thing as a report about the condition of your lungs need not even be discussed. I counted just under 160 such forms, with the stamp of the fluorography office where, of course, it is stated that you were found to have no pathological changes.

The file was discovered under circumstances that have not yet been fully determined. The former chief of the medical station maintains that he found it on the desk of one of the women on the staff of the school which is serviced by the medical station. She denies any connection whatsoever to either the file or its contents and, in turn, blames the person who found the file of having stolen the wallet out of her purse.

Oh well, the militia will straighten this out. I am concerned with something else, where did the file with blank medical forms originate?

I decided to pursue my own small investigation. With the help of the Main Administration for Public Health, it was possible to determine that the medical certificate found in the file had been issued almost 10 years ago among others by the Vyborg Rayon Health Department for transmission to polyclinics. The subsequent traces of this form have been lost.

I went to Polyclinic No 10 in Krasnogvardeyskiy Rayon, which is under the jurisdiction of the medical station and the stamp of which decorated the reports from the fluorographic office. Incidentally, this information was not very consistent on the forms--just ordinary sheets of paper torn out of school notebooks, cut off from commercial papers and even from laundry tickets.

Frankly speaking, I was sure that they would be just as concerned at the polyclinic with what had happened as I was. After all, it is no joking matter to have 156 blank forms and about 50 already filled out with the stamp of the fluorography office. However, M. V. Pavlova, chief physician at the polyclinic was not disturbed.

"So what--some sort of stamp," she exclaimed. "I made some inquiries after your call. I learned that we have been using a new stamp for about 2 years. At the time when the old one disappeared, there was a brigade from the tuberculosis dispensary working here. They probably are the ones who lost it. You have to ask them."

As they say, no comment is necessary.

Nor were the people at Polyclinic No 57 in Kalininskiy Rayon particularly upset, although the oncologist's stamp and round seal on the prescriptions of that institution attested to the right of disabled veterans to receive free medicine.

"These are old, obsolete prescriptions," declared Z. P. Kudryashova, chief physician. "It is unlikely that drugs would be issued for them."

So be it, I thought, after a conversation with Zinaida Petrovna. The prescriptions found in the file are not valid. But what assurance is there that they had not been used previously? However, in this case too I could not determine how they disappeared from the polyclinic and who was responsible for their being kept.

The chief physician at polyclinic No 27 in Oktyabrskiy Rayon, I. Ye. Stroganov also failed to answer my question. I asked him to check which of the doctors owned the prescription blanks with the stamp and round seal of the polyclinic. If he had wanted to, it would probably not have been particularly difficult to find out, since there was a doctor's signature on each of them. One of them stated, for example, that student Yu. Martynov had been sick from 10 to 14 May of this year, and for this reason could not attend classes.

I was unable to find out how the stamp of the Krasnobor walk-in center appeared on blank referrals for clinical analyses. And there were also quite a few of these forms in the file....

So it would appear that the chief of the polyclinic, Pavlova, is right--there is no problem of blank forms or lost stamps, and that the history of their appearance is not worth a wooden nickel. I can't agree with such an opinion.

Invalid prescriptions are submitted almost daily to the city's pharmacies. For example, in the 1.5 hours that I spent in Pharmacy No 26, which is on Suворovskiy Avenue, two prescriptions were removed that were prescribed for Yu. Loginov and V. Frolov by the physician, Katsnel'son (surname is on the stamp) at Polyclinic No 9 in Smolninskiy Rayon (stamp and seal of the institution are also there). A check revealed that not only is a physician by this name unlisted at that institution, but he never worked there. A forgery? Of course. But the forms and the seal of the polyclinic are genuine! And the visitors to the pharmacy had not written out some trivial items for themselves, but a rather scarce medication. It is a good thing that the pharmacy employees were alert. But what if they had not noticed the falsification?

Unfortunately, invalid prescriptions are not such a rare phenomenon. In the first 6 months of this year alone they constituted about 30% of the total number of prescriptions submitted to the city's pharmacies. The percentage is particularly high for those originating in polyclinics of Petrogradskiy and Smolninskiy rayons--78 and 63%, respectively. In essence, these are blanks that have been filled out illiterately or incorrectly. For example, without the physician's personal stamp, without indication of age and other information about the patient, on old, obsolete blanks, etc.

At the Main Pharmaceutical Administration I was told about the results of a check made last month. A total of 1380 invalid prescriptions had been removed from the city's pharmacies, more than 400 of which turned out to be nothing other than forgeries. In other words, there were no records at the polyclinics to corroborate the seals and stamps on the prescription forms, there were not even outpatient charts for individuals who had tried to obtain medication with them. In another 64 cases, although there were charts, appropriate entries had not been made on them concerning orders for drugs for the individuals whose surnames were on the prescriptions. The figures are impressive, but even they cannot fully reflect the situation with falsified prescription blanks, since it is not always easy to detect forgery. What is particularly alarming is that all of the drugs requested in the forged prescriptions are referable mainly to extremely scarce ones.

"Of course, the problem of blank forms and forged prescriptions does exist," stated V. A. Zhagulo, inspector of the Main Public Health Administration. "A physician must report to the management of his institution each case of loss or theft of seals, stamps or forms, and it must inform the rayon health department. Unfortunately, this is not done always by far."

This is only one of the reasons why blank forms turn up in the hands of dishonest people. But the chief cause is the thoughtless attitude of some medical workers toward documents and their uncontrolled use.

On a table in the physician's office, in the bag that he takes for house calls, there are often many blank prescriptions, that are not written out but have

stamps and seals affixed. Just how many there are, even the physician does not always know. Why not have them accounted for, as for example is the case for the medical certificates? I am sure that there would be a drastic reduction in unforeseen thefts and loss. There would also be a change in attitude toward prescription blanks. They would become what they are in essence, official documents that are issued by a state institution....

To this day, falsified prescriptions and blank medical forms are "circulating" in the city. This means that it is time to put an end to it. Now it is probably apparent why this affair, which is almost a detective story, still has no end.

10,657

CSO: 1840/255

## HEALTH SERVICES CRITICIZED

Moscow SOVETSKAYA ROSSIYA in Russian 19 Jan 85 p 1

[Text] A new stage is beginning in the development of national public health. The adoption of an annual universal public medical examination for the entire population of the country is a most important task decreed by the Party which is essentially the initiation of a qualitatively new stage in the strategy of public health maintenance and reinforcement during the period of advanced socialism. This task entails not only medical measures, but a major socio-economic program whose implementation would be impossible without the active participation of Party and Soviet organs, all ministries and departments, trade union, and other public organizations. In this sense, universal medical examinations are truly an all-inclusive state affair. The first link in this program is an annual medical examination of each person accompanied by whatever tests that may be required. It is important to identify diseases at their earliest possible stages, to prevent their exacerbation, to maintain the people's fitness for work, and in the final analysis, to extend the average life expectancy of the populace. One should note the status of public health has been under systematic observation for some time now. But there are still some individual categories of the population in our purview. For example, there are now 26 million persons registered for clinical check-ups in the Russian Federation. In addition, tens of millions of workers, teenagers, and children are involved in periodic preventive medical examinations. These are hopeful prerequisites to solving the problem as a whole. In a number of places preventive examination models have been worked out for rayons and oblasts. Particular attention and analysis should be given to those small areas in which some experience has already been gained. While successfully resolving many problems in this new endeavor, but remaining in a quandry when faced with other problems, experimenters are willy-nilly all but discovering the main problem of this new reorganization. That is, that the universal preventive medical examination program is possible only if there is a high level of organization among the medical collectives, a clear-cut performance discipline, and a quality of work that is beyond reproach. This problem, for example, has been encountered in the Matveyevo-Kurgansiy Rayon of the Rostov Oblast. Interesting and useful attempts have been undertaken there to shift over to a program of continuous universal preventive medical examinations. But at the same time, improvements in laboratory services were found to be necessary. The proper utilization of local hospital resources would make it possible to examine an additional 700 persons annually. Estimates indicate that the additional work load placed on out-patient clinics and polyclinics of the



republic is growing by one-third, and the volume of laboratory, x-ray diagnostic, fluoroscopic, and other examinations is increasing by 40 percent. All of this requires a radical improvement in the operations of the health system and an increase in the general quality of medical services. Tasks concerned with the effective utilization of material, financial, and personnel resources, the training and retraining of physicians and middle medical personnel have been given top priority. Hospitals, polyclinics, and out-patient clinics are waiting for more modern diagnostic, therapeutic, and other kinds of equipment from industry, particularly mobile and portable equipment. Only forty to fifty percent of the requisitions from Russian Federation for that kind of equipment are being filled by the Ministry of the Medical Industry. But, on the other hand, as indicated by materials published in SOVETSKAYA ROSSIYA, better use must be made of existing medical equipment in the therapeutic-prophylactic institutions themselves. Difficulties of another kind are also presenting problems. Not all groups of the population are as yet fully aware of the importance and benefits to be gained from universal preventive medical examinations [hereafter referred to as dispensarization], so getting people to show up for examinations has not always been easy. By the same token, one cannot make any claims about continuous dispensarization without complete and precise knowledge about the health status of all the people and the distribution of disease morbidity. There are no kinds of "approximation" methods that are suitable for this purpose. Scientific studies have shown, for example, that approximately 40 percent of the persons with myocardial ischemia in the 50 to 59 age group are not seeking medical assistance and don't know about their condition. But dispensarization is not an end in itself. It is not enough merely to identify those who need treatment. Preventive and therapeutic work must be organized. Are the medical institutions really ready to cope with increased work load, particularly in the initial stages? An examination of this question at a recent session of the Presidium of the RSFSR Council of Ministers showed that the material-technical base of the "health sector" is not being satisfactorily strengthened in a number of places. Some time ago the first People's Health Commissar N. A. Semashko said: "Prevention should not be understood to be merely a specialized departmental task of health agencies, but rather as a broad and profound concern of the Soviet state about strengthening the health of the Soviet people." Those words take on a particularly vital meaning today. The dispensary method of serving the public, which provides for a major planned program of socioeconomic, organizational-methodological, and many fundamentally medical measures, would be impossible to realize without constant active cooperation between public health agencies and operational and public organizations. All the details involved in the preparations for and implementation of dispensarization are being worked out more rapidly and successfully wherever Party and soviet organs are supervising the consolidation of this complex operation. This question, for example, was examined at a joint session of the Buro of the Penza Obkom of the Party, the board of the RSFSR Ministry of Health, the ispolkom of the oblast Council of People's Deputies, and the oblast council of trade unions. A special comprehensive plan of measures was worked out and adopted for the dispensarization of the oblast population. The question of a multi-planned approach to preventive medicine cannot help but be raised at the stage of advanced socialism and scientific-technological progress. Here everything must "work" for the health of the people. This includes providing for the essential technical environmental parameters and improved

working and living conditions. But that is the goal. As yet that goal is often lost from sight in actual practice. For example, the Vologda and Smolensk oblispolkoms and ministries of the textile and light industries have given little attention to the mechanization of labor-intensive processes and the reduction of injurious factors in their comprehensive plans for improving conditions, industrial safety, and medical-sanitation measures. There are not too many examples of a concise control over the execution of useful measures. The fact that the level of occupational morbidity has risen in a number of sectors is also a cause for concern. There are still many gross violations tolerated in the storage, transport, and utilization of chemicals in agriculture. The role of local Party and soviet organs is a particularly large one in the elimination of these deficiencies. Not all of the violations become issues of fundamental discussion, and decisive measures are not always taken to eliminate shortcomings. Persons guilty of violations often escape with impunity. What is most important is that the attitude of non-interference, the unwillingness to go forward with the entire set of socioeconomic measures, acutely limit the potential of the dispensarization program in its initial stages. The radical change in the nature of the entire operation is in no small way due to the fact that from now on attention will be intently focused not only on the sick, but every healthy person. In order to maintain and strengthen the health of all the people and provide them with proper physical and mental development, perhaps one should first of all take advantage of the opportunities that are most accessible, i.e., open more widely the doors of stadiums and gymnasiums, pools, and courts, and allow people to utilize without hindrance all athletic and physical cultural facilities. In a word, dispensarization poses the task of optimal survival. This is not simply a question of protecting people against disease-causing factors, but of eliminating the causes of sickness. This cannot be done without the participation of the people themselves. As we know, people themselves create a whole series of preconditions that lead to sickness. Harmful habits and traditions, constant violations of work, recreational, and nutritional requirements, and improper vital rhythm are sufficient cumulative grounds for a person to lose his health and the joys of a full-blooded life even before he reaches old age. The skill of the medical personnel is also reflected by their ability to influence people, to provide them with knowledge, and to devise regimens suited to the individual. Primary preventive medicine must become one of the important forms in the struggle to preserve the health of the people, and it is they who must aid in this struggle.

6289

CSO: 1840/189

#### BRIEF

EYE MICROSURGERY MEETING--The out-of-town meeting of the Presidium of the Central Council of the All-Union Society of Inventors and Innovators and the Presidium of the Central Committee of the Professional Union of Medical Workers was held 20 Feb 85 at the Moscow Scientific Research Institute of Microsurgery of the Eye of the RSFSR Ministry of Health. This scientific research institute is one of the newest in the public health system, but in the years of the 11th Five-Year Plan it has become the largest center in the USSR and Europe for surgical treatment of eye diseases. Under the leadership of S. Fedorov, who is a member-correspondent of the USSR Academy of Medical Sciences and who has served as an inventor at the institute, a prosthesis of the cornea of the eye, a synthetic crystalline lens and a method of surgical treatment of myopia have been developed. They have gained recognition in the whole world. Introduction of these inventions into practice was placed under the public control of the VOIR [not further identified]. Collaboration has yielded good fruit. The trial of this cooperative activity was approved and recommended for wide introduction in other branches. [By A. Dibochkin] [Text] [Moscow TRUD in Russian 21 Feb 85 p 4] 12410

CSO: 1840/213

#### BRIEF

LITHUANIAN MEDICAL SERVICES--Vilnius (EL'TA) 16 Jan--An expanded session of the Board of the Lithuanian SSR Ministry of Health was convened today at which problems concerned with further improvements in the republic's health services were discussed. Minister of Health of the Lithuanian SSR I. I. Platukis presented a report on the tasks of republic organs and health institutions in fulfilling the State plan for the economic and social development of the USSR for 1985 as outlined in the speech by General Secretary of the CPSU Central Committee, comrade K. U. Chernenko. It was noted that the material base of the republic's therapeutic institutions has strengthened and is continuing to strengthen and the supply of apparatus and equipment to those institutions is improving. Broad progress was made by scientific research and its practical applications. The ranks of highly skilled medical personnel have grown. There are now approximately 42 physicians and 121 paramedical personnel on the average per 10,000 persons of the population. The implementation of a program for the prevention of chronic non-infectious diseases and the annual preventive medical examination has been successfully begun. At the same time, it was emphasized at the session that it is very important that available specialists must be properly utilized and distributed. Also essential is a constant concern about improving the professional knowledge and skills of physicians and the need to combat frequently encountered violations of medical ethics, indifference of medical personnel, and to heighten the role of medical personnel in the life of society. The session also emphasized the role of Party, Komsomol, and trade union organizations of therapeutic institutions in strengthening public health, implementing a program of prophylaxis, and in eliminating shortcomings in the work of medical personnel. The session was addressed by Secretary of the Lithuanian CP Central Committee L. K. Shepetis. Participating in the work of the session were Deputy Chairman of the republic's Council of Ministers A. Yu. Chesnavichus, Chief of the Science and Educational Institutions Department of the Lithuanian CP Committee V. S. Baltrunas, and other responsible Party and Soviet officials. [Text] [Vilnius SOVETSKAYA LITVA in Russian 17 Jan 85 p 3] 6289

CSO: 1840/188

## BRIEF

MEDICAL RESEARCH PROBLEMS DISCUSSED--[Editorial Report] Tashkent SOVET OZBEKISTONI in Uzbek 4 August 1984 carries on page 2 a 1,600-word article by N. Abdullayev, Professor at the Tashkent State Institute of Medicine, titled "Honorable and Responsible." Abdullayev discusses several problems in medical research. One shortcoming is the lack of clear, long-term programs aimed at resolving problems relating to arteriosclerosis, cancer, the endocrine glands, and hereditary and nonspecific diseases, as well as to environmental effects on the human organism. Moreover, in order to direct and coordinate research from various sciences on these problems it would be advisable to organize science-production unions in the field of health care and medicine under the leadership and guidance of the treatment and prevention administration, the scientific medicine council, and appropriate commissions of the republic Ministry of Health. There are also various shortcomings of an organizational character in the orientation of research and in solving the problem of cadres. The republic still has no specialists with doctoral or candidate degrees in some fields of medicine, including endocrinology, hereditary diseases, obstetrics, gynecology, hematology, pediatrics, physical therapy, allergenics, immunology, eye diseases, pathological anatomy, microbiology, and virusology. What is amazing is that there are branch scientific research institutes for some of these areas. Abdullayev concludes that it's the duty of Uzbek scholars to train specialists in heart and blood diseases, oncology, endocrinology, and hereditary and non-specific diseases, to produce preventive measures and expand research on these diseases, and to introduce the results of their research into medical practice.

CSO: 1840/204

## PROBLEM OF PROTRACTED HEALTH RESORT CONSTRUCTION

Moscow IZVESTIYA in Russian 11 Jan 85 p 1

KOZLOV, I., Chairman of Central Council on Trade Union Trade Health Resorts Management

[Abstract] Delays in trade union health resort construction and equipping were discussed with mention of construction delays at specific health resorts and citation of figures concerning failure of ministries to use allocated funds for health resort construction. Diversion of funds needed for use to ensure health care for maintenance and repair projects was discussed. Failure to deal with environmental protection problems was described. Violations of "The Statute on Health Resorts", confirmed by the USSR Council of Ministers and of other decrees were mentioned and discussed briefly. Figures reflecting improvement in trade union health resort construction and service in the first 4 years of the current Five-Year Plan were cited.  
[199-2791]

## HOW IS YOUR HEALTH? CLINICAL HEALTH CARE--ONE OF MOST URGENT CONCERNS OF PARTY COMMITTEES

Moscow SOVETSKAYA ROSSIYA in Russian 5 Feb 85 p 2

KULIKOV, F., 1st Secretary of the Penza CPSU Oblast Committee

[Abstract] Steps being taken to ensure adequate clinical care in Penza Oblast are described and discussed. Improvements in medical assistance dating back to the 1960s are described briefly. Efforts of the oblast regional committee to improve the material and technical base of medical services were discussed and some results of these efforts are described. Work of a joint congress of the bureau of the oblast committee on a plan to implement universal annual medical examinations is discussed. Special attention being given to improvement of regional hospitals, out-patient services and feldsher-midwife stations is emphasized. Plans for expanding physical plant with the aid of industrial enterprises and farms having hospitals is discussed. Measures taken by Penza hospital to provide health services to rural areas by staffing brigades

for on-site service and instructional and propaganda work being conducted by party agencies of the oblasts are described. Solutions of social problems and improvement of work conditions, especially work under hazardous conditions, are cited as prerequisites of further improvement of clinical care. The need to accelerate delivery of emergency vehicles and equipment and to increase the volume of research reports and literature concerning clinical care is discussed. [210-2791]

#### ANNUAL PREVENTIVE MEDICAL EXAMINATION: A NEW STAGE

Kishinev SOVETSKAYA MOLDAVIYA in Russian 22 Jan 85 p 4

TESTEMITSANU, N., head of the 1st Chair of Social Hygiene and Organization of Health Care, Kishinev State Medical Institute, MSSR State Prize Laureate, professor and TINTYAK, D., candidate of medical sciences

[Abstract] Steps required to ensure provision of universal annual physical examinations [dispensarization] were discussed in very general remarks. Items mentioned include: the organization of methodical supervision of annual medical examinations, the special role of out-patient polyclinics in the process, the importance of studies directed at early detection, prophylaxis and treatment of diseases, introduction and expansion of computer-assisted procedures in the work, the need for educational and propaganda work to teach the population about healthful life styles and risk factors and improvement of work conditions and living conditions. [211-2791]

#### MAN'S PRICELESS GIFT--GOOD HEALTH: THREE PROBLEMS RELATED TO THIS IMPORTANT MATTER

Moscow SEL'SKAYA ZHIZN' in Russian 23 Jan 85 p 3

[Abstract] Sergey Petrovich Burenko, USSR Minister of Health discussed three major issues involved in attempts to improve health care in rural regions: provision of adequate health care in these regions of the USSR, provision of medical monitoring and care to protect rural populations from hazards arising from extension of use of new agricultural and industrial processes in rural regions and provision of adequate staff with high qualifications and modern equipment and inventory to the rural health service. Burdenko said that excellent health care in rural areas is now being provided for entire oblasts as opposed to the previous situation in which such care was available only in some rayons and at individual hospitals. He cited examples of improvements in this area but emphasized the need for improved telephone communications systems at feldsher and feldsher-midwife stations and the need for construction of medical facilities. He described monitoring processes being used to ensure protection from health hazards which arise in areas in which new technological and agricultural processes are being used in rural areas. He discussed improvements in staffing rural area health facilities and important aspects of provision of specialized medical cares in rural areas. [212-2791]

## MISMANAGEMENT IN CONTACT LENS INDUSTRY

Moscow TRUD in Russian 6 Jan 85 p 2

VLADIMIROV, V. and MOKRISHCHEV, N., special correspondents, Donetsk-Moscow

[Abstract] Bureaucratic confusion, non-coordination and mismanagement have made a shambles of the Soviet contact lens industry, depriving some four million Soviet citizens with a specific need for that type of corrective lenses, from having their legitimate medical needs fulfilled. A visit to the Izyum Optico-Mechanical Plant, which is charged with production of hard and soft contact lenses, makes everything clear. Lack of cooperation between the ministries has resulted in shortage of appropriate equipment and supplies, as a result of which expensive imported instruments are grossly underutilized or not used at all. For example, such lenses as are produced are polished with Pomorin toothpaste, and the polymeric starting material for the manufacture of soft contact lenses is not yet being even synthesized by the suppliers, let alone being shipped to the Izyum plant. Talks with responsible personages at the Ministry of Medical Industry and USSR Ministry of Health simply reveals individuals unwilling to take responsibility for this state of affairs, and too willing and quick to put the blame on others, rather than take a critical look at themselves.

[197-12172]

UDC 612.39+613.2+616.39)]001.5:061.62(574)

## ACHIEVEMENTS AND PROSPECTS IN NUTRITIONAL RESEARCH AT KAZAKH BRANCH OF INSTITUTE OF NUTRITION, USSR ACADEMY OF MEDICAL SCIENCES

Moscow VOPROSY PITANIYA in Russian No 6, Nov-Dec 84  
(manuscript received 24 Aug 84) pp 3-7

SHARMANOV, T. Sh., academician, USSR Academy of Medical Sciences

[Abstract] Originally, studies on the nutritional status of the population of Kazakhstan began in 1962 under the aegis of the Kazakh SSR Ministry of Health, and dealt largely with the problem of providing a balanced diet to a population subsisting largely on grain and flour meals. In 1974 the Kazakh branch of the Institute of Nutrition of the USSR Academy of Medical Sciences was opened in Alma-Ata, and provided the stimulus for extensive and all-encompassing studies on nutrition. The studies conducted at the Alma-Ata branch encompass basic research and clinical investigations, and cover diet modification, nutritional supplements, nutritional aspects of disease and immunity, and metabolism. Future emphasis will be placed on further developing a better biochemical understanding of nutrition, development of new protein sources, and on nutritional factors pertinent to extreme environmental conditions (alpine, desert) and physiological status (hypokinesia, age), as well as on food safety. References 26: 24 Russian, 2 Western.

[1734-12172]



## COMPUTERS IN MEDICINE

Tbilisi ZARYA VOSTOKA in Russian 23 Jan 85 p 4

[Abstract] "Trauma Computer" is the designation given to the data processing system implemented at the Scientific Center of Traumatology and Orthopedics of the Georgian SSR Ministry of Health. This medically-oriented computer system is the brainchild of Nodar Georgiyevich Lobanidze, candidate of medical sciences and chief anesthesiologists in Tbilisi. The system was started from scratch with full cooperation between scientists in Georgia and Moscow, and was unique in that clinicians were involved in the planning stages. As it is presently designed, the system is capable of constant monitoring of vital functions in emergency and critical care situations, therapy planning, dosage designations, diagnosis, and prognosis. Another program is being designed for the psychological preparation of patients for surgery. Shortage of qualified personnel is the only factor that keeps the system from being utilized on a round-the-clock basis, but even that problem will be overcome in due time. [215-12172]

## AGRICULTURAL HEALTH SERVICES

Moscow SEL'SKAYA ZHIZN' in Russian 23 Jan 85 p 2

[Abstract] A talk with S. P. Burenkov, USSR Minister of Health, has put new light on some of the advances and problems of agricultural health services in the USSR. Certain regions, such as the Ivano-Frankovsk Oblast of the Ukrainian SSR, have made remarkable progress in insuring a high level of medical services for the farm workers, whereas others have fallen further behind. For example, 86% of the rural health facilities in the Ivano-Frankovsk Oblast are staffed by highly qualified physicians and meet current medical standards. In other areas, such as certain areas of the RSFSR, Kazakhstan, Tajikistan, Uzbekistan, Azerbaijan, etc., many of the clinics are without telephone service. To make the matters even more difficult, the authorities in many rural areas have not provided for adequate living quarters for physicians and other medical personnel, not to mention other rudimentary amenities. Despite the difficulties that are being encountered, positive movement is noted on an overall basis with provision of specialized medical services to the agricultural workers, the construction of new hospitals, and the training of new cadres of highly motivated physicians and medical assistants. [221-12172]

## SOVIET INDUSTRIAL HYGIENE

Moscow STROITEL'NAYA GAZETA in Russian 14 Dec 84 p 4

IARINA, N.

[Abstract] An interview with N. Izmerov, Director of the Institute of Labor Hygiene and Occupational Diseases of the USSR Academy of Medical Sciences,

revealed the scope of Soviet industrial medicine and hygiene, as represented by the work of some 120 educational and research establishments. Analysis of the various work factors and laboratory studies have resulted in the setting of norms for work conditions with a view toward improving the health of workers. Many of such studies were conducted on a cooperative basis with scientists and physicians in other countries, such as Finland and the GDR. In addition, considerable attention and effort has been expended on assessing the climatic environments which are unique to the USSR, such as those encountered in the Far North and Siberia, in which industrial development has been scaled up. The primary approach of Soviet industrial medicine and hygiene consists of prevention. This is the most effective and rational approach, and has been the cornerstone of Soviet medicine since the founding of the Soviet State. In addition to concern with the state of industrial health in the USSR, the Institute and other establishments are active in rendering assistance to less well-developed countries and in participating in the various WHO programs. [229-12172]

#### ANNUAL HEALTH EXAMINATIONS

Tallinn SOVETSKAYA ESTONIYA in Russian 5 Jan 85 p 3

[Abstract] With the implementation of an annual health examination program in the USSR, Sovetskaya Estonia has received many inquiries from readers interested in learning more about preventive medicine and the manner in which this program will be implemented. In view of this, the editors turned to L. Piyel', the chief therapist of the Tallinn Executive Committee, for explanations and advice regarding the ramifications of this new health policy. L. Piyel' explained that this program is basically designed to improve the health and welfare of the Soviet population through early detection and prevention of various incapacitating medical conditions, and that full success requires cooperation and understanding from the citizens, particularly those identified as being at risk of some disease. The latter category generally includes cardiovascular diseases, and it is regrettable that many people falling into that category don't take their appointments for periodic health examinations seriously and that they fail to show up. The health consciousness of the population must be raised to a sufficiently high degree to make the health programs provided by the Soviet government a resounding success. [214-12172]

MECHANISM OF ACTION OF DIALKYL AMINOETHYL THIOL DERIVATIVES OF PYRIMIDINE  
AND QUINAZOLINE

Moscow RADIOBIOLOGIYA in Russian Vol 24, No 6, Nov-Dec 84 (manuscript received  
20 Feb 84) pp 838-842

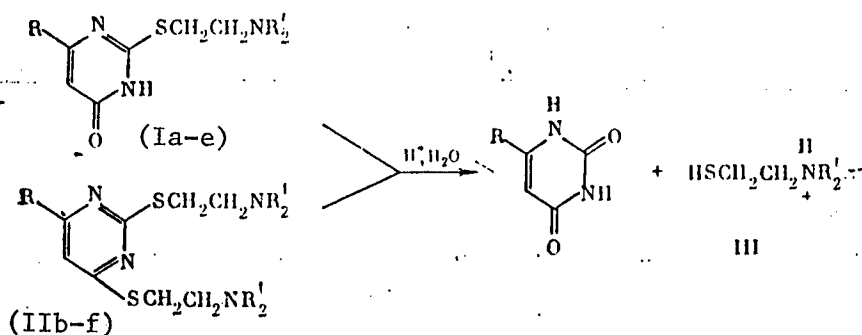
[Article by I. P. Tregubenko, E. A. Tarakhtiy, M. V. Chibiryak, B. V. Golomolzin, L. G. Yegorova and L. A. Bartel', Institute of Plant and Animal Ecology, Ural Science Center of the USSR Academy of Sciences and Ural Polytechnic Institute imeni S. M. Kirov, Sverdlovsk]

[Text] Among the derivatives of  $\beta$ -aminoethyl isothiuronium, its heterocyclic analogues, which contain an amidine group as part of the heterocyclic ring, are of special interest. It has been demonstrated [1-3] that dialkyl aminoethyl thiol derivatives of quinazoline and pyrimidine have radioprotective activity. Since these compounds contain a tertiary amino group, the known conceptions of the fact that AET and its simple derivatives effect their radioprotective action either by means of transguanidation [4] or intramolecular connection in thiadiazolines [5] are not applicable to explain their radioprotective action.

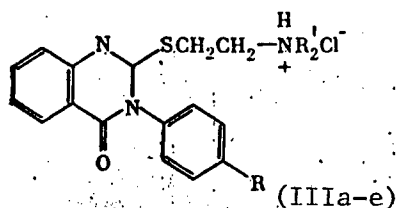
As was discovered [3], 2-( $\beta$ -dialkyl aminoethyl)-thiopyrimidinones-4 (I) and 2,4-bis-( $\beta$ -dialkyl aminoethyl)-thiopyrimidines (II) can be hydrolytically dissociated with release of free dialkyl aminothiols (III) (see diagram on the following page).

It could have been assumed that such a process is perhaps one of the important elements in the mechanism of radioprotective action of compounds I and II. For this reason, we studied the kinetics of hydrolysis, determined the rate of hydrolysis and compared them to the radioprotective activity of compounds I and II (because of the slow hydrolysis of compounds III, we were unable to obtain the kinetic characteristics of the reaction).

The body's oxygen uptake is a highly informative indicator for predicting survival of irradiated animals [6], as well as identifying the mechanism of action of radioprotective agents. With this in mind, we investigated the change in animals' oxygen uptake under the effect of the compounds under study, as compared to their radioprotective activity.



- a)  $\text{R} = \text{CH}_3$   $\text{R}' = \text{C}_2\text{H}_5$     b)  $\text{R} = \text{H}$   $\text{R}' = \text{C}_2\text{H}_5$     c)  $\text{R} = \text{CH}_3$   $\text{NR}'_2 = \text{--N--} \begin{array}{c} \diagup \text{O} \diagdown \end{array}$   
 d)  $\text{R} = \text{H}$   $\text{NR}'_2 = \text{--N--} \begin{array}{c} \diagup \text{O} \diagdown \end{array}$     e)  $\text{R} = \text{CH}_3$   $\text{NR}'_2 = \text{--N--} \begin{array}{c} \diagup \text{O} \diagdown \end{array}$     f)  $\text{R} = \text{H}$   $\text{NR}'_2 = \text{--N--} \begin{array}{c} \diagup \text{O} \diagdown \end{array}$



- a)  $\text{R} = \text{H}$   $\text{R}' = \text{CH}_3$     b)  $\text{R} = \text{OCH}_3$   $\text{R}' = \text{CH}_3$     c)  $\text{R} = \text{OCH}_3$   $\text{R}' = \text{C}_2\text{H}_5$   
 d)  $\text{R} = \text{H}$   $\text{R}' = \text{C}_2\text{H}_5$     e)  $\text{R} = \text{CH}_3$   $\text{R}' = \text{CH}_3$

## Material and Methods

The compounds, in the form of aqueous solutions, were injected intraperitoneally to BalB mice 3 months of age in a dosage constituting  $1/2 \text{ LD}_{16}$ , which was found from the toxicity curve, in a volume of  $0.2 \text{ ml}/20 \text{ g}$  animal weight, pH 6.0-7.0. The animals were irradiated with  $^{137}\text{Cs}$   $\gamma$ -rays delivered from an Igru-1 unit in a dosage of  $206.4 \text{ mC/kg}$ , which is the minimal absolutely lethal dose, at a dose rate of  $0.516 \text{ mA/kg}$ . The methods of testing radioprotective activity are described in detail in [1-3]. Oxygen uptake was determined using an MN-5130 optical-acoustic gas analyzer [7]. Five mice at a time were placed into an exsiccator contained in the instrument's closed system. We recorded oxygen uptake for 10 min and repeated the readings every 30 min for 4-5 h. We calculated the amount of oxygen uptake in vol.% per gram weight per hour using the formula,  $x = p\text{O}_2 \cdot 6/p$ , where  $p\text{O}_2$  is the difference between oxygen content of air and found in the experiment,  $p$  is the animals' weight and 6 is a conversion coefficient. The results listed in the Table are expressed as percentage of oxygen uptake demonstrated prior to giving the animal the tested compound, which was considered as 100%.

In the experiments conducted to find the kinetic curves of hydrolysis of compounds I and II, the reaction was run in 0.3 N sulfuric acid solution at  $70^\circ\text{C}$ ;

Radioprotective activity, oxygen uptake and rate of hydrolysis of  $\beta$ -dialkyl aminoethyl thiol derivatives of pyridine and quinazoline

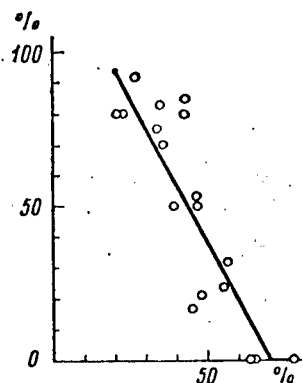
Compound	R	-NR <sub>2</sub>	LD <sub>50</sub> , mg/kg	Radioprot. activity			O <sub>2</sub> uptake, %	Hydro- lysis, $\tau_{0.5}$ (I), $\tau_{0.1}$ (II), min
				dose given, mg/kg	min be- fore irrad.	survival %		
Ia	Methyl	Diethylamino	416	194	15 30	60 80	42 67	18,5
Ib	—	„	400	225	15 30 45	6; 52 0; 56 0	46 50	21,1
Ic	Methyl	Morpholyl	395	165	15 30	45 50	46 54	18,7
Ie	„	Piperidyl	184	68	15 30	24 20	55 77	19,3
Id	—	Morpholyl	170	69	15 30 60 90	— 32 5 11	56 75 69 —	20,4
IIb	—	Diethylamino	80	41	15 30	0 0	81 69	>1000
IIc	Methyl	Morpholyl	274	137	15 30 60 70	70; 79 44; 55 — 15	35 65 54 —	500
IId	—	„	266	133	15 30 60	65; 54; 42 90; 85; 79 20; 10 —	42 63 63	500
IIe	Methyl	Piperidyl	163	109	15 30	21 0	55 55	>1000
IIIf	—	„	56	22	15 30	0 0	78 78	>1000
IIIa	—	Dimethyl- amino	123	54	15 30	42; 8 0; 50	42 39	—
IIIb	Methoxy	„	157	59	15 30 45 60 78	0 0 75 58 15 30 45 60	53 34 26 26 — — — —	—
IIIc	„	„	92	92	15 30	30 75	50 33	—
IIId	—	„	120	50	15 30	0 0	— —	—
IIIe	Methyl	„	56	56	15 30	0; 17 0; 8	45 45	—

spectrometry was used to determine the concentration of initial compound, and we plotted the curve of change in this concentration as a function of time. It was found that the hydrolysis reaction of compounds I is of first order for the base substance, so that we used the half-conversion time ( $\tau = 0.5$ ) as the reciprocal of reaction rate. Using methods of statistical analysis [8-10], we

estimated the differences in terms of  $\tau_{0.5}$  (Table). We found that these values differ with statistical significance, i.e., the differences are determined by the difference in chemical structure of the relevant compounds. Compounds II are hydrolyzed considerably more slowly than I, and for them we selected the time of 10% conversion ( $\tau_{0.1}$ ) as a relative gage of rate of hydrolysis.

## Results and Discussion

Among the quinazoline derivatives, compound IIIb (2-( $\beta$ -diethyl aminoethyl)-thio-3-p-methoxyphenyl quinazolinone) was found to have the maximum protective effect; 33-92% of the mice survived, depending on the time before irradiation that it was given (Table). The same compound also reduces oxygen uptake the most, 24% of the base level by the 2d postadministration hour, and the protective effect lasts for a long time. Compounds IIIa (2-( $\beta$ -dimethyl aminoethyl)-thio-3-phenylquinazolinone-4) and IIIc (2-( $\beta$ -diethyl aminoethyl)-thio-3-p-methoxyphenyl-quinazolinone-4) are less active and they also lower oxygen uptake to a lesser extent.



Radioprotective activity of the compounds as a function of degree of decline of oxygen uptake

X-axis, oxygen uptake, %;

y-axis, survival, %. Equation

of linear regression is

$$y = 1.87x + 132.19; r = -0.87$$

A similar pattern is demonstrable in the class of 2-mono- and 2-4-bis-( $\beta$ -dialkyl aminoethyl)-thiopyrimidines (I and II), where the protective effect is related to decreased oxygen uptake (which differs for different compounds). Although there is no strict parallel between the extent of decline of oxygen uptake and survival percentage after irradiation, correlation analysis (Figure) indicates that there is a close relationship between these parameters for the tested compounds, and the coefficient of correlation is  $-0.87$ .

It is apparent from the data listed in the table that there is decrease in radioprotective activity of the compounds in both the mono- and bis-heterocyclic dialkyl aminoethyl thiol derivatives (I and II) with decline of rate of hydrolysis (increase in time  $\tau_{0.5}$  and  $\tau_{0.1}$ ).

In spite of the difference between the mechanism of hydrolysis and its absolute rates in vitro, the observed pattern confirms the hypothesis that hydrolytic dissociation of heterocyclic dialkyl aminoethyl thiol derivatives proceeds with formation of free amino thiol, which makes its contribution to the mechanism of radioprotective action of these compounds.

Thus, we have demonstrated that the degree of decline of oxygen uptake by the body is directly related to radioprotective activity of some of the dialkyl aminoethyl thiol derivatives of pyrimidine and quinazoline that we tested. Oxygen uptake may be used as one of the tests to predict the level of radioprotective activity of compounds in this class. We found a correspondence between rate of hydrolytic dissociation of the compounds studied with formation

of free aminothiols and radioprotective activity, which enables us to conclude that such dissociation is significant to the mechanism of radioprotective action.

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CSO: 1840/1719

UDC 577.391:547.963;546.79

RADIONUCLIDES INCORPORATED INTO POLYNUCLEOTIDES: MODEL SYSTEM FOR DNA  
RADIATION DAMAGE

Moscow RADIOBIOLOGIYA in Russian Vol 24, No 6, Nov-Dec 84  
(manuscript received 29 Feb 84) pp 728-738

KOROLEV, V. G., Leningrad Institute of Nuclear Physics imeni  
B. P. Konstantinov

[Abstract] A model system was devised for evaluation of externally induced radiation damage in DNA by employing microbial systems with radionuclides incorporated in the DNA strands. This approach makes possible an assessment of the biological sequelae in which a defined quantity of energy is absorbed by a given atom in the DNA molecule, data that are impossible to secure with external sources of ionizing radiation. Comparative analysis of the consequences of radionuclide disintegration in the cytoplasm and DNA has shown that the genetic material is the primary, if not the sole, target of radiation. The probability of yeast cell death as a result of  $^3\text{H}$  disintegration within DNA is approximately one hundred-fold greater than for the same event occurring within a protein molecule. Similarly, 1.5% of the  $^{32}\text{P}$  atoms incorporated into DNA account for 90% of the biological effects. In the case of  $^{125}\text{I}$  lethal outcome is four-fold higher for radionuclide in DNA as opposed to the rest of the cell. The studies with  $^3\text{H}$  incorporated into DNA have shown that a single lesion in the nucleotide chain from the isotope located in the various bases may not be lethal, but may lead to mutations. However, lesions occurring on both strands of the DNA invariably have lethal consequences. Figures 2; references 30: 13 Russian, 17 Western.  
[1716-12172]



# NUCLEIC ACID METABOLISM IN RAT HEMATOPOIETIC TISSUE DURING AND AFTER CHRONIC TRITIUM OXIDE ADMINISTRATION

Moscow RADIOBIOLOGIYA in Russian Vol 24, No 6, Nov-Dec 84  
(manuscript received 21 Sep 82) pp 764-769

MUSHKACHEVA, G. S., RUSINOVA, G. G., SHOROKHOVA, V. B., TURDAKOVA, V. A. and POVOLOTSKAYA, S. V., Institute of Biophysics, USSR Ministry of Health, Moscow

[Abstract] The effects of prolonged tritium oxide administration on nucleic acid metabolism in hematopoietic tissue were studied in male Wistar rats maintained on tritium oxide for 1-3 months (0.37, 0.925 or 1.85 Bq/g, 5X/week; intragastric). Analysis of bone marrow and splenic tissues demonstrated that administration of the isotope depressed karyocyte counts and nucleic acid levels variably altered the rate of nucleic acid biosynthesis, increased the concentration of salt-soluble polydeoxyribonucleotides, and activated DNases. As a rule, the metabolic alterations followed dose-effect principles, with recovery of baseline or near-baseline parameters delayed in the case of the higher dosages. In addition, compensatory processes were more efficient in the bone marrow than in the spleen. Survival studies showed that rats on the 0.37 Bq/g schedule presented with an 18% shorter lifetime than comparable control animals. The lifespan of animals on the 0.925 Bq/g regimen was decreased by 30%, while all animals on the 1.85 Bq/g regimen succumbed within 80 days. In the latter group the LD<sub>50/45</sub> for tritium oxide was calculated at 20 Gy. Figures 3; references 7 (Russian).  
[1716-12172]

# COMPARATIVE STUDIES ON EFFECTS OF SEVERAL RADIONUCLIDES ON CHLORELLA POPULATIONS

Moscow RADIOBIOLOGIYA in Russian Vol 24, No 6, Nov-Dec 84  
(manuscript received 9 Feb 83) pp 786-789

SHVOBENE, R. Ya., MARCHYULYONENE, D. P. and SHULIYENE, R. I., Institute of Botany, Lithuanian SSR Academy of Science, Vilnius

[Abstract] The effects of equivalent doses of Sr-90, Ce-144 and Cs-137 on chlorella (*Chlorella vulgaris*) populations were evaluated in terms of photosynthetic activity, cell density and the numbers of mutant and lethally-damaged cells. In terms of reducing cell density the radionuclides were found to rank as follows: Sr-90 > Ce-144 > Cs-137, while in terms of diminishing photosynthetic activity the ranking followed the sequence Ce-144 > Sr-90 > Cs-137. Sr-90 was the radionuclide most effective in inducing mutations, exceeding the efficiency of the other two radionuclides 1.7-fold. However, under

equivalent conditions, Ce-144 was found to be more efficient in inducing lethal mutations than Sr-90 or Cs-137. These observations, obtained for the dose range  $3.7 \times 10^4$  to  $3.7 \times 10^6$  Bq/liter, can be extrapolated to an upper limit of  $1.8 \times 10^{10}$  Bq/liter. Figures 2; references 10: 8 Russian, 2 Western. [1716-12172]

UDC 577.391

#### EFFECTS OF GAMMA IRRADIATION ON SYNCHRONOUS NUCLEAR DIVISION IN PHYSARUM POLYCEPHALUM PLASMODIA

Moscow RADIOBIOLOGIYA in Russian Vol 24, No 6, Nov-Dec 84  
(manuscript received 2 Jan 84) pp 790-793

GUSHCHA, N. I., DMITRIYEV, A. P. and GRODZINSKIY, D. M., Institute of Plant Physiology, Ukrainian SSR Academy of Sciences, Kiev

[Abstract] Radiobiological studies on the plasmodia of the myxomycete Physarum polycephalum demonstrated that Co-60 gamma irradiation (2.5 Gy/sec) in the middle of the S phase of the cell cycle and in the  $G_2$  phase resulted in a dose-dependent lag in synchronous nuclear division. The effects were evident with doses extending to 3000 Gy. One of the possible reasons for the induced delay, which was greater with irradiation in the S phase than in the  $G_2$  phase, may have been the much greater probability of 'fixation' of the molecular lesion in the DNA at the time of replication in those phases, particularly in the former. Since DNA replications requires momentary uncoiling and separation of the polynucleotide strands at the point of initiation, irradiation at that point in time may induce more lesions than can be repaired in a short period of time. Synchronous nuclear division may be a mechanism in affording P. Polycephalum high radioresistance. The lag in synchronous division may reflect additional time required for the elimination of radiation-damaged nuclei. Figures 2; references 14: 1 Russian, 13 Western. [1716-12172]

UDC 577.391;612.015.32;591.13

#### FEEDING LIMITATION EFFECTS ON LIPID METABOLISM IN RATS SUBJECTED TO SINGLE LETHAL IRRADIATION

Moscow RADIOBIOLOGIYA in Russian Vol 24, No 6, Nov-Dec 84  
(manuscript received 25 Jan 83) pp 794-797

TOROPILA, M., ALERS, I., ALERSOVA, Ye., DYATELINKA, I. and PRASLICHKA, M., Natural Sciences Faculty, P. J. Safarik University, Kosice, Czechoslovakia

[Abstract] Wistar rats were employed in a study to determine the effects of feeding-limitation on lipid metabolism in animals subjected to a single lethal x-irradiation (14.35 Gy). The experimental rats had access to food for 2 h

per day for 3 weeks and, prior to irradiation, were fasted for 22 h. Control animals were fasted only for 22 h before irradiation. Following irradiation, blood chemistries showed that, in the experimental animals serum, unesterified fatty acids increased by 10% within 1 h, and showed an overall decrease of 33% by 48 h after irradiation. The findings in the control animals were an initial decrease by 33% in 1 h, and a 10% increase over baseline by 48 h. Graph-depiction of data also showed differences between the two groups in the degree of change in serum cholesterol and phospholipid levels, with cholesterol levels showing depression between hours 1 and 24, and phospholipids showing a decrease in 1 h. Triglyceride levels in the bone marrow of the experimental animals showed a trend toward elevation in the postradiation period, while in the control animals a more variable pattern was evident. These observations underline the importance of dietary and nutritional factors in assessing the effects of irradiation. Figures 5; references 12: 3 Czech, 2 Slovak, 1 Russian, 6 Western.  
[1716-12172]

UDC 577.391;611.42;612.014.2

HIGH DOSE GAMMA-IRRADIATION AND CHROMOSOMAL ABNORMALITIES IN HUMAN LYMPHOCYTE CELL CULTURE: DOSE-EFFECT RELATIONSHIP

Moscow RADIOBIOLOGIYA in Russian Vol 24, No 6, Nov-Dec 84  
(manuscript received 1 Nov 83) pp 801-804

SEVAN'KAYEV, A. V., Scientific Research Institute of Medical Radiology, USSR Academy of Medical Sciences, Obninsk

[Abstract] Dose-effect relationships in the induction of chromosomal abnormalities in cell cultures of human lymphocytes were studied by subjecting such cultures to Co-60 gamma-irradiation in a dose range of 5-12 Gy (0.5 Gy/min). Cytogenetic analysis of the effects on cells irradiated in the G<sub>0</sub> phase of the cell cycle, prior to stimulation with phytohemagglutinin, showed that at low doses the number of chromosomal abnormalities per cell followed linear-quadratic equations, but that at higher doses the plots were transformed into strictly linear relationships. The chromosomal aberrations included a high frequency of chromatid abnormalities, ranging from 5.7/100 cells at 5 Gy to 15.6/100 cells at 12 Gy. These differences in the frequency of the chromatid-type abnormalities were ascribed to the fact that at low-dose irradiation the repair mechanisms are less impaired than at the higher doses. Figures 2; references 7: 6 Russian, 1 Western.  
[1716-12172]

PERIPHERAL BLOOD RETICULOCYTE DYNAMICS IN RATS WITHIN 24 HOUR POSTRADIATION PERIOD FOLLOWING UNIFORM WHOLE-BODY  $^{60}\text{Co}$  GAMMA IRRADIATION

Moscow RADIOBIOLOGIYA in Russian Vol 24, No 6, Nov-Dec 84  
(manuscript received 1 Nov 83) pp 804-807

REMIZOVA, I. V., Central Scientific Research Roentgenoradiological Institute, USSR Ministry of Health, Leningrad

[Abstract] Outbred rats were employed in a study to determine the characteristics of peripheral blood reticulocyte dynamics following Co-60 gamma irradiation with doses ranging from 4.03 to 12.5 Gy (equivalent to  $\text{LD}_{0/30}$  to  $\text{LD}_{100/11}$ ). Observation for a 24 h postirradiation period showed a dose-related depression of the reticulocyte counts, with full recovery of the baseline value in animals irradiated with the 4.03 Gy dose by the end of the period of observation. Other groups of animals showed depression of the counts ranging from 25% to more than 90% (12.5 Gy) within that timeframe. Evaluation of the reticulocyte formula demonstrated that the more immature forms were much more susceptible to irradiation and showed the greatest reduction in counts following irradiation. In summary, changes in the reticulocyte counts and alterations in the differential formula were seen to accurately reflect the severity of the acute stages of radiation sickness, and may constitute an approach for the clinical evaluation of such pathology. Figures 2; references 9: 4 Russian, 5 Western.  
[1716-12172]

EFFECTS OF ENDOTOXIN ON MIGRATION OF HEMOPOIETIC COLONY-FORMING CELLS AND REPOPULATION OF HEMATOPOIETIC ORGANS IN PARTIALLY IRRADIATED MICE

Moscow RADIOBIOLOGIYA in Russian Vol 24, No 6, Nov-Dec 84  
(manuscript received 20 Sep 83) pp 807-811

KLESTOVA, O. V., RYABUKHA, A. K., SHAPIRO, N. I. and STRELIN, G. S., Scientific Research Roentgenoradiological Institute, USSR Ministry of Health, Leningrad

[Abstract] The effects of endotoxins of different potencies on repopulation of hematopoietic tissues in x-irradiated (CBA x C57BL) $F_1$  mice were assessed in a system involving splenic irradiation (9 Gy), followed in 1-2 h by intravenous endotoxin (300  $\mu\text{g}/\text{animal}$ ). The course in control, endotoxin-untreated, whole-body irradiated animals consisted of marked reduction in splenic mass by day 9 on the order of 60%, and death of approximately 50% of the animals with only a few mice showing single splenic colonies. No deaths occurred in control animals with a portion of the bone marrow shielded during irradiation, loss of splenic mass was somewhat attenuated, and the average number of colonies in

the spleen stood at ca. 21, indicating migration into the spleen of hemato-poietic colony-forming cells from the protected bone marrow. Within the identical timeframe the splenic weight actually exceeded normal control values in mice treated with potent endotoxin derived from *Salmonella paratyphi* B, indicating that both migration into the spleen and actual colony formation were markedly enhanced by the endotoxin. These observations suggest that endotoxin may be used to enhance splenic repopulation in cases of sublethal irradiation in conjunction with, or as a substitute for, bone marrow auto-transplantation. References 18: 13 Russian, 5 Western.  
[1716-12172]

UDC 577.391;599.323.4;546.79

APPLICATION OF GOMPERTZ CURVE TO SURVIVAL DATA IN CHRONIC INTERNAL IRRADIATION

Moscow RADIOBIOLOGIYA in Russian Vol 24, No 6, Nov-Dec 84  
(manuscript received 26 Oct 83) pp 820-822

PANTELEYEV, L. I. and SHVEDOV, V. L., Institute of Biophysics, USSR Ministry of Health, Moscow

[Abstract] The Gompertz curve was applied to survival data on rats exposed per os to Sr-90 in doses of 1.85 to 185 kBq/day, to evaluate the utility of such an approach to survival analysis vis-a-vis prolonged internal exposure. Analysis of the mortality kinetics demonstrated that with chronic intake of Sr-90 over a lifetime the reciprocal of the survival mode increases linearly with the daily dose of the radionuclide. Since this relationship is inversely proportional, the earlier proposal of a linear relationship appears to be inapplicable to such studies [Blair, Ha., Peaceful uses of Atomic Energy, 11: 118-120, 1956]. Figures 2; references 3: 1 Russian, 2 Western.  
[1716-12172]

UDC 577.391+576.311.347+547.96

EFFECTS OF TORTOISE SPLENIC EXTRACT ON HEPATIC MITOCHONDRIA OF IRRADIATED MICE

Moscow RADIOBIOLOGIYA in Russian Vol 24, No 6, Nov-Dec 84  
(manuscript received 23 Mar 83) pp 834-838

TURDYEV, A. A., IVANOV, V. I., TRIFONOV, Yu. A., ABBASOVA, I. A. and USMANOV, R. B., Institute of Zoology and Parasitology, Uzbek SSR Academy of Sciences, Tashkent

[Abstract] In view of the high radioresistance of the Central Asian tortoise *Testudo horsfieldi*, trials were conducted with tortoise splenic extracts to determine whether such extracts possess factors capable of rectifying radiation-induced metabolic changes in hepatic mitochondria. Outbred mice were

subjected to Co-60 gamma irradiation in a dose of  $2.06 \times 10^{-1}$  C/kg and, within 2 h, treated intravenously with 0.3 ml of the splenic extract containing 0.4 mg protein, to determine the effects of irradiation on mitochondrial function. Irradiation alone was seen to depress succinate oxidation by 42%, decreased the P/O ratio by 30%, increased the phosphorylation time 2.5-fold, and decreased succinate dehydrogenase activity by 24%. Additional changes consisted of eventual increases in the levels of cholesterol, free fatty acids and triglycerides. Most of the changes were corrected or compensated by treatment with the extract, except that P/O remained significantly depressed. In addition, changes in mitochondrial lipids were entirely prevented by the extract. It remains a possibility that the extract exerts its effects by inactivation of endogenous radiosensitizers. Figures 4; references 13: 9 Russian, 4 Western. [1716-12172]

UDC 577.346:[577.352.333+546.41]:612.8

# PHOSPHOLIPID COMPOSITION AND $\text{Ca}^{2+}$ BINDING BY BRAIN MEMBRANE FRACTION OF IRRADIATED RATS

Kiev DOKLADY AKADEMII NAUK UKRAINSKOY SSR, SERIYA B: GEOLOGICHESKIYE, KHIMICHESKIYE I BIOLOGICHESKIYE NAUKI in Russian No 12, Dec 84 (manuscript received 20 Mar 84) pp 53-55

GRINCHUK, D. V., SKOPENKO, Ye. V., VASIL'YEV, A. N. and KUCHERENKO, N. Ye., Kiev State University imeni T. G. Shevchenko

[Abstract] Synaptosomes, microsomes and synaptosomal plasma membranes were isolated from rats to evaluate the effects of whole-body x-irradiation (0.21 C/kg) on the lipid composition of these membranes and their binding of calcium ions. Within 1 h of irradiation there were no remarkable changes in the lipid composition, with the exception of lysophosphatidylcholine which showed a 3.1-fold increase. Lineweaver-Burk plots indicated that the synaptosomes possessed the highest affinity for  $\text{Ca}^{2+}$  ( $K_d = 10^{-4}$  M), and the microsomes the lowest ( $K_d = 2 \times 10^{-4}$  M). However, the latter possessed the highest binding capacity for  $\text{Ca}^{2+}$  (40.5 nmoles/(min·mg protein)), and the synaptosomes the lowest (7.9 nmoles/(min·mg protein)). One hour after irradiation the affinity of the synaptosomes, synaptosomal membranes and microsomes for  $\text{Ca}^{2+}$  increased 2.4-, 2.3- and 3.5-fold, respectively. Concomitantly, binding capacities showed a respective 1.4-, 1.7- and 3.4-fold decrease. These changes may have been related to activation of  $\text{Ca}^{2+}$ -dependent phospholipase, which may account for the increase in the lysophosphatidylcholine component. Figures 1; references 12: 5 Russian, 7 Western. [1702-12172]

## CONFERENCES

### BRIEFS

ALL-UNION THERMOREGULATION SEMINAR--Ivanov was the site of the third All-Union seminar on "Theoretical and practical problems of human and farm animal heat regulation." Its participants included physiologists, pathophysiologists, hygienists and representatives of space medicine. Prominent specialists reported current data on various problems of thermoregulation, fluid-electrolyte metabolism in thermoregulation, problems of heat and mass transfer in circulation, circulation and digestion at high ambient temperatures.

[By I. Bryazgunov, doctor of medical sciences] [Text] [Moscow MEDITSINSKAYA GAZETA in Russian 26 Dec 84 p 3] 10,657

UDC 613.2-057:63:[664:339]:008(47+57):061.3(47+57)"1984"

DELIBERATIONS ON RURAL HYGIENE AT ALL-UNION CONFERENCE ON 'USSR FOOD PROGRAM AND COMPLEX ISSUES OF RURAL HYGIENE'

Moscow GIGIYENA I SANITARIYA in Russian No 12, Dec 84 pp 75-76

POPIK, S. Ya. and DENISYAKO, Ye. I., Kiev Scientific Research Institute of Nutrition Hygiene

[Abstract] An All-Union conference on "The USSR Food Program and Complex Issues of Rural Hygiene" was held in Kiev on March 27-29, 1984. This conference, in particular, dealt with the complex issues facing the Food Program vis-a-vis the rural agricultural workers, i.e., their nutrition, health, longevity, and productivity. The nutritional status and nutritional requirements of the agricultural workers were analyzed in light of extended data collected from different climatic regions (RSFSR, Ukraine, Georgia, Kazakhstan, Lithuania, Uzbekistan, Kirghizia) over a period of many years. Such studies demonstrated that, depending on occupation, the agricultural workers expend from 2700 kcal (11,340 kJ) to 3500 kcal (14,700 kJ) of energy per day. Special attention was also accorded to improving agricultural hygiene, and of fitting diet to occupation. For the future, such studies will be further expanded and state control over the agricultural working environment will be considerably strengthened to enforce all health and sanitary regulations.  
[1735-12172]

UDC 614.71:061.3(476)"1984"

SCIENTIFIC AND PRACTICAL CONFERENCE ON PREVENTION OF AIR POLLUTION

Moscow GIGIYENA I SANITARIYA in Russian No 12, Dec 84 pp 76-77

POLYAK, V. Ye., Shchelkovo Sanitary-Epidemiologic Station, Moscow Oblast

[Abstract] A practical and scientific conference on the prevention of air pollution in the RSFSR was held on January 24-26 in Novokuznetsk. The conference was organized by the RSFSR Ministry of Health and the Central Council of the All-Russian Society for Nature Protection. The conference covered both practical and theoretical topics, and emphasized the need for closer monitoring of various industries discharging pollutants into the atmosphere. Specific



case studies were presented demonstrating the effectiveness of various devices that reduce pollutant discharge, and that can effectively re-utilize waste gases and particles in the industrial cycle. Other topics dealt with the effects of air pollution on human health, and the conference ended with a call for more intensified efforts in monitoring and controlling air pollution in the RSFSR.

[1735-12172]

## MISCELLANEOUS

### PERFORMANCE OF SOVIET HOSPITAL IN NICARAGUA PRAISED

Moscow MEDITSINSKAYA GAZETA in Russian 1 Jan 85 p 3

[Article by V. Paramonov, Academy of Pedagogic Sciences reporter for MEDITSINSKAYA GAZETA, Managua, "Helping People Who Are Building a New Life--in Fulfillment of International Duty"]

[Text] "My leg does not bother me any more, and it does not hurt to walk," said the smiling, dark complexioned young girl as she gets up from the cot and cautiously but steadily takes a few steps in the ward.

Physicians from the USSR, who work at the Hospital imeni Soviet-Nicaraguan Friendship near Chinandega, took 5 months to help the 18-year-old Oneyda Mukiya, who got under the wheel of a truck and had already become reconciled to the idea that she would remain a cripple.

The "Hospital Sovietico," which was opened in July of 1982 to render medical care to victims of the flood, stayed in Nicaragua even after eradicating the sequelae of that disaster. The patients who have undergone a successful course of treatment, as usual, shared their impressions with relatives, friends and neighbors. As a result, a couple of weeks later, there was a line at the hospital gate of people from the same town as the patients. Care is provided there for all without exception. And now, patients are traveling to Chinandega from Costa Rica, telling truths and lies to get there from Honduras. Today, the patients include Swedes, Americans, Ecuadorans and Swiss nationals.

The resuscitation department is in gentle semi-darkness. The quiet is disturbed only by the barely audible whirring of an air conditioner. Beyond the thick glass walls we can see young men in bed. They will return to the places where their comrades are protecting schools and coffee plantations from attacking "contras."

There are more than 20 Soviet specialists working at the hospital, including 14 registered nurses. A total of 160,000 patients have passed through the polyclinic department in 2.5 years, and 6200 were hospitalized.

"What are the main diseases that your patients have?" I asked A. S. Lutkov, chief physician.

Most diseases are related in some way or other to the living conditions of Nicaraguan workers, who are compelled not only to work selflessly to restore the devastated economy, but to defend the people's rule and revolution. Of course, a situation in which people live at frontier posts, in the mountains, often without elementary hygienic conditions, does not help eradicate epidemic diseases. Malaria is a very frequent diagnosis. Thyroid diseases are not uncommon; this is apparently related to the shortage of iodine, which is inherent in Nicaraguans. As for traumatism, in most cases it is referable to wounds sustained in battles with counterrevolutionaries.

... One of the patients admitted to the hospital the previous day is a driver at a lumber enterprise in the province of Chinandega, named Vilfredo Martinez; he is 23 years old. Next to his bed is his mother, Dona Austela Ortiz.

"I am relying on God and on Soviet physicians to cure my son," says the woman. "I am very grateful to the Soviet physicians for the good care he is receiving here."

Vilfredo's main occupation is as a driver. But he also takes a submachine gun when necessary and, as part of a territorial militia battalion, clears the adjacent mountains of TsRU [CIA] bandits who were dispatched there.

"I have participated in the battles for Jalanu and San Jacinto," Vilfredo tells us. "At present it is quiet there. It would appear that the Contras have given up on capturing them because of the powerful resistance they encountered."

... There are three flags waving in the wind near the main entrance to the hospital: the white and blue one, which is the national flag of Nicaragua, a red and black one, of the Sandinista National Revolutionary Front and a ruby-colored one, of the Union of Soviet Socialist Republics. As stressed by the health minister of Nicaragua, Lea Gido, the Soviet physicians were able to organize efficient work at the hospital. They are displaying a high feeling of internationalism, helping their Nicaraguan colleagues and all the people in a republic that is building a new life.

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CSO: 1840/1726

# BRIEF

CZECHOSLOVAK MEDICAL EXPERTS--A group of scientists from Czechoslovakia's medical center for treating contagious diseases has arrived in Uzbekistan. The scientists will acquaint themselves with the work being carried out by the medical institute in Uzbekistan in contagious liver diseases. Ever since 1982 this institute has been working as one of the local centers for studying and treating contagious liver diseases. Because contagious liver diseases are common in many countries, great importance is being attached to studying and treating them throughout the world. Uzbek scientists and experts have been contributing significantly toward this effort. [Text] [Tashkent International Service in Uzbek 1700 GMT 22 Jan 85 GF]

CSO: 1840/205/E

# BRIEF

NEW TASHKENT CHEMICAL INSTITUTE--(UzTAG)--The regularly scheduled session of the republic commission for improving the effectiveness and quality of work examined the operations of the Tashkent All-Union Scientific-Research Chemico-Technological Institute of the Medical Industry (VNIKhTIMP) with respect to the practical implementation of scientific-research projects. This institute is one of the republic's newest, and was organized just four years ago. But a stable collective has already evolved here that is capable of resolving complex tasks, and an experimental-test base has been organized. The Institute has already fulfilled 27 scientific-research projects, ten of which have been introduced into industry with a resultant economic impact of more than ten million rubles. At the same time, the Institute has not yet set up the future planning of major scientific-research projects, a comprehensive target-oriented approach to solving important national economic problems is not being practiced, and scientific efforts and funds are being overextended. The creative yield of the scientific personnel has not been high. The Commission has recommended that the Institute's management eliminate the present shortcomings, strengthen its ties with the enterprises, direct the efforts of the scientific associates towards solving target-oriented problems, improve the effectiveness of scientific-research projects and accelerate their implementation, and perform more economic contract jobs. The session also examined and approved a work plan for the republic commission for effectiveness and quality for 1985.

[Text] [Tashkent PRAVDA VOSTOKA in Russian 27 Dec 84 p 2] 6289

CSO: 1840/188

## MENTAL TELEPATHY BEAM

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 24 Jan 85 p 4

DMITRUK, M.

[Abstract] A talk with V. F. Nechiporenko, professor at the Second Moscow Medical Institute and author of the book "Biolinguistics in the Making", elucidated some of his ideas on human communication. Basically, Professor Nechiporenko advances the hypothesis that "mnemobeams" created in the human subconsciousness underlie telepathic communication, and represent the final embodiment of a continuous information exchange among all the organs and system in a human body. These beams may appear as intuition, and may also form the basis of such phenomena as hypnosis, a form of communication among individuals in which the individuum with a more potent beam predominates. It will remain for future scientific findings to corroborate or negate this hypothesis, but for the time being it is said to constitute a challenging concept.

[193-12172]

## BUILDING BRIDGE INTO FUTURE

Moscow MEDITSINSKAYA GAZETA in Russian 28 Nov 84 p 3

[Interview with Aleksandr Aleksandrovich Bayev, who has been awarded the USSR State Prize and is the Academician Secretary of the Department of Biochemistry, Biophysics and Chemistry of Physiologically Active Compounds of the USSR Academy of Sciences, and the head of the Laboratory of Functional Enzymology at the Institute of Molecular Biology, USSR Academy of Sciences, conducted by V. Taratorkin]

[Abstract] Four years ago a joint session of the USSR Academy of Sciences and the USSR Academy of Medical Sciences opened up new possibilities for cooperation between members of the two academies. This interview focuses on developments in interdisciplinary fields between biology and medicine. Although the gap between biology and medicine has been spanned to some extent by biomedicine, this discipline focuses on nonclinical research. Interdisciplinary studies have been promoted by the creation of institutions such as the All-Union Cardiology Research Center, USSR Academy of Medical Sciences, the director of

which is Ye. I. Chazov. The most critical problems in cardiology were studied here by young specialists from various institutes of the USSR Academy of Sciences and the Moscow State University imeni M. V. Lomonosov. Similar research centers were also organized in the field of oncology, with both clinicians and biologists participating in the study of tumor etiology. A discovery in the field of microbiology was made at the Institute of Microbial Biochemistry and Physiology, USSR Academy of Sciences; a lytic agent, containing a protein with a molecular mass of 11,000 Daltons and exhibiting properties of the enzyme cleaving the peptidoglycan polysaccharide chain in bacterial cell walls, was isolated from a bacterial culture. This agent appeared to be active against a variety of pathogenic bacteria, from staphylococci with multiple antibiotic resistance to Sarcina and Bacillus species. The new field of genetic engineering has made it possible to use bacteria as biological factories to synthesize human proteins such as interferon or blood components (e.g., serum albumin, hemoglobin) on a scale that can meet the needs of medicine. Bayev speculates that by the year 2000 the cause of cancer and cardiovascular diseases will have been elucidated. Further progress will have been made in the synthesis of various hormones and proteins by the techniques of genetic engineering, as well as in the prevention of infectious diseases, chemotherapy and disease pathogenesis.

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